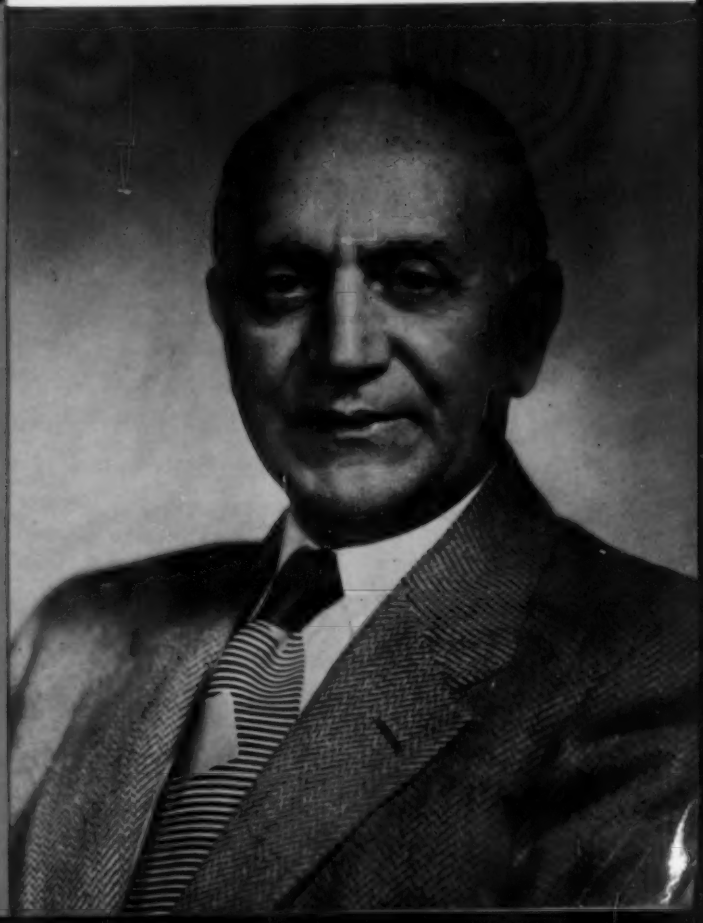
AGRICULTURAL *Chemicals*

IN THIS ISSUE:



JULY, 1960

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INTERNATIONAL MARKET ROUNDUP

INTEREST in overseas markets in purchasing currently is very brisk. India is in the market for 20,000 tons of calcium ammonium nitrate; 20,000 tons of ammonium sulphate nitrate; 80,000 tons of ammonium sulphate; 24,000 tons of urea. Korea will be in the market during June/July for approximately $14.32 million worth of nitrogenous and phosphatic fertilizer materials. Pakistan also is in the market for nitrogen, phosphates and potash.

Fertilizer producers all over the world are ending the fertilizer year with practically no carry-over, due to their energetic attempts to move their surplus tonnage. Therefore, it is possible that, during the coming year, prices may stiffen somewhat, much as they are doing in the United States domestic market. The keen awareness of the need for fertilizer, which is spreading to many new areas of the world and which is becoming more pronounced in those areas which are already consuming fertilizer, gives rise to the belief that the consumption of fertilizer will continue to increase over current levels.

Meeting of FAO

The Food and Agriculture Organization meeting, held in Rome on April 26/27, was attended by most of the major fertilizer interests of the world, with American, Canadian, European, Indian and Japanese representatives attending.

A resolution was drawn up calling for contributions to be solicited from fertilizer and sulphur interests with a view to raising $500 per thousand por year for a five-year period in order to introduce and promote the use of fertilizer in the agricultural economy of certain under-developed countries. This program, which will be under the supervision of the United Nations, will have the guidance and experience of the participating fertilizer organizations.

Interest has been shown by the Potash Institute, the Sulphur Institute and discussions are being held in the near future in an attempt to interest various American producers in this project.

European nitrogen and potash producers have evinced a strong desire to participate, and discussions also were held at the International Superphosphate Manufacturers Association meeting in Venice in a successful attempt to interest superphosphate producers.

ICI Cuts Prices

Prices of all fertilizers produced by I.C.I. have been reduced, effective July 1. The reductions will represent a saving to British agriculture of approximately £1 million in 1960-61.

The reductions are based partly on increased sales in the 1959-60 season and the company's confidence in the expanding use of fertilizers in the coming year, and partly on improved methods of production. None of the raw materials are expected to be cheaper.

Prepared by International Ore and Fertilizer Co., New York

This Month's Cover

Dr. Vincent Sauchelli, embarks on a new facet of his lengthy service in the agricultural chemicals industry. See story on page 79, this issue.

Vol. 15, No. 7 July, 1960

AGRICULTURAL *Chemicals*

ARTICLES

FEATURES

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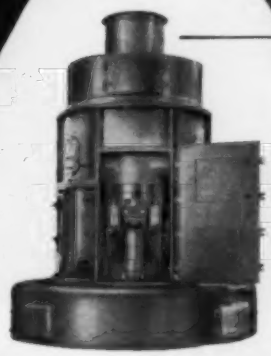

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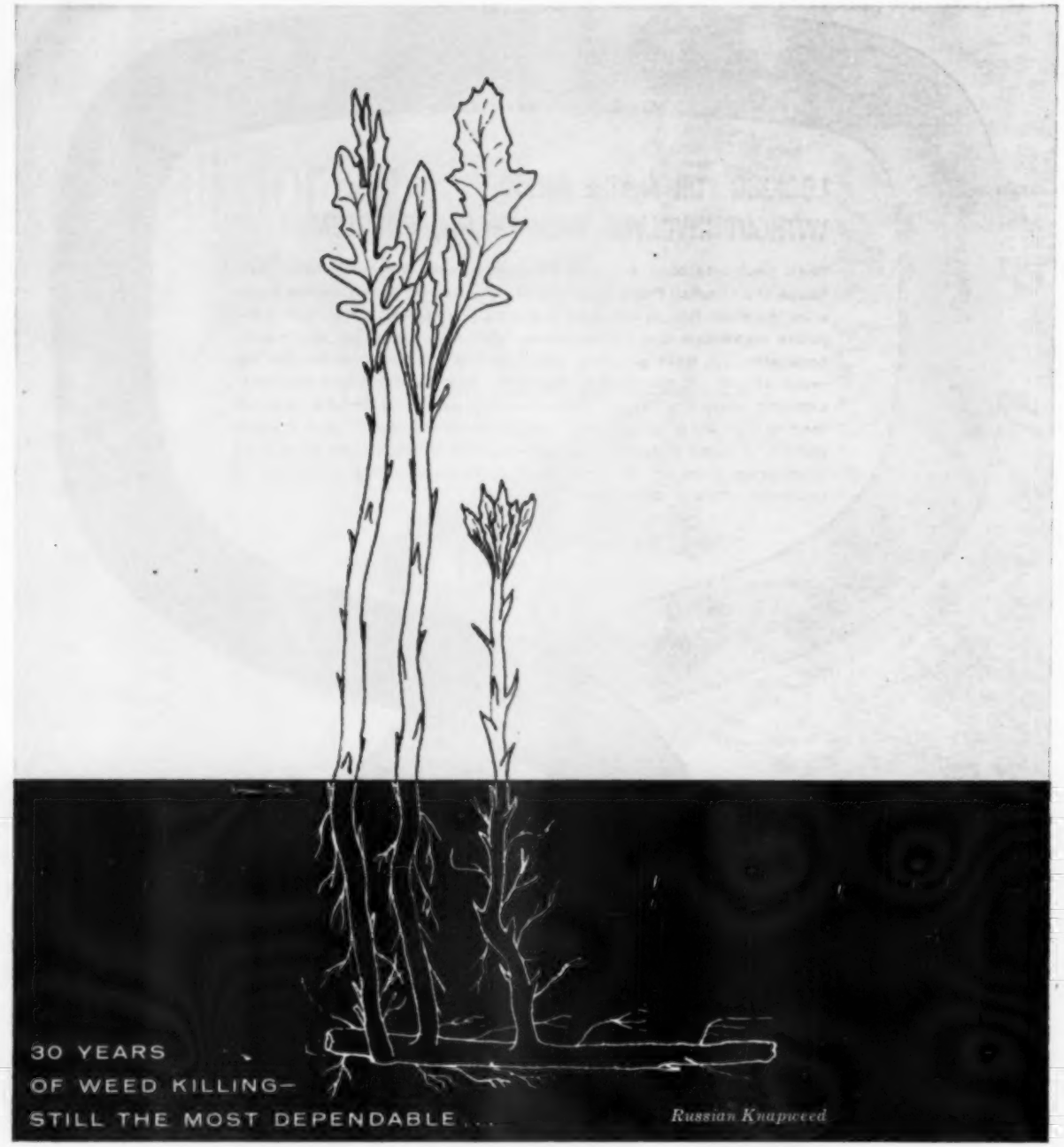

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National Agricultural Chemicals Association, Association Building, 1145 19th St., N.W., Washington, D. C. Lea Hitchner, exec. sec.

National Plant Food Institute, 1700 K St., N.W., Washington, D. C. Paul Truitt, president.

American Potash Institute, 1102 16th St., N.W., Washington 6, D. C. H. B. Mann, president.

American Society of Agronomy, 2702 Monroe St., Madison, Wisc. L. G. Monthey, exec. sec.

American Phytopathological Society, S. E. A. McCallan, secretary. Boyce Thompson Institute, Yonkers, N. Y.

American Chemical Society, 1155 16th St., N. W., Washington, D. C.

Association of Official Agricultural Chemists, P. O. Box 540, Benjamin Franklin Station, Washington, D. C. William Horwitz, secretary-treasurer.

Agricultural Ammonia Institute, Hotel Claridge, Room 305, Memphis, Tenn. Jack Criswell, executive vice-president.

American Society of Agricultural Engineers, F. B. Lanham, secretary, 505 Pleasant St., St. Joseph, Mo.

Carolinas-Virginia Pesticide Formulators Association, 516 S. Salisbury St., Raleigh, N. C. Hugh Horn, secretary-treasurer.

California Fertilizer Association, Sidney Bierly, executive secretary, Room 213, Ochsner Building, 719 "K" Street, Sacramento, Calif.

Chemical Specialties Manufacturers Association, 50 East 41st St., New York City. Dr. H. W. Hamilton, secretary.

Entomological Society of America, 4603 Calvert Rd., College Park, Md. R. H. Nelson, secretary.

National Fertilizer Solutions Association, 2217 Tribune Tower, Chicago, Ill. M. F. Collie, secretary.

National Cotton Council, P. O. Box 9905, Memphis, Tenn.

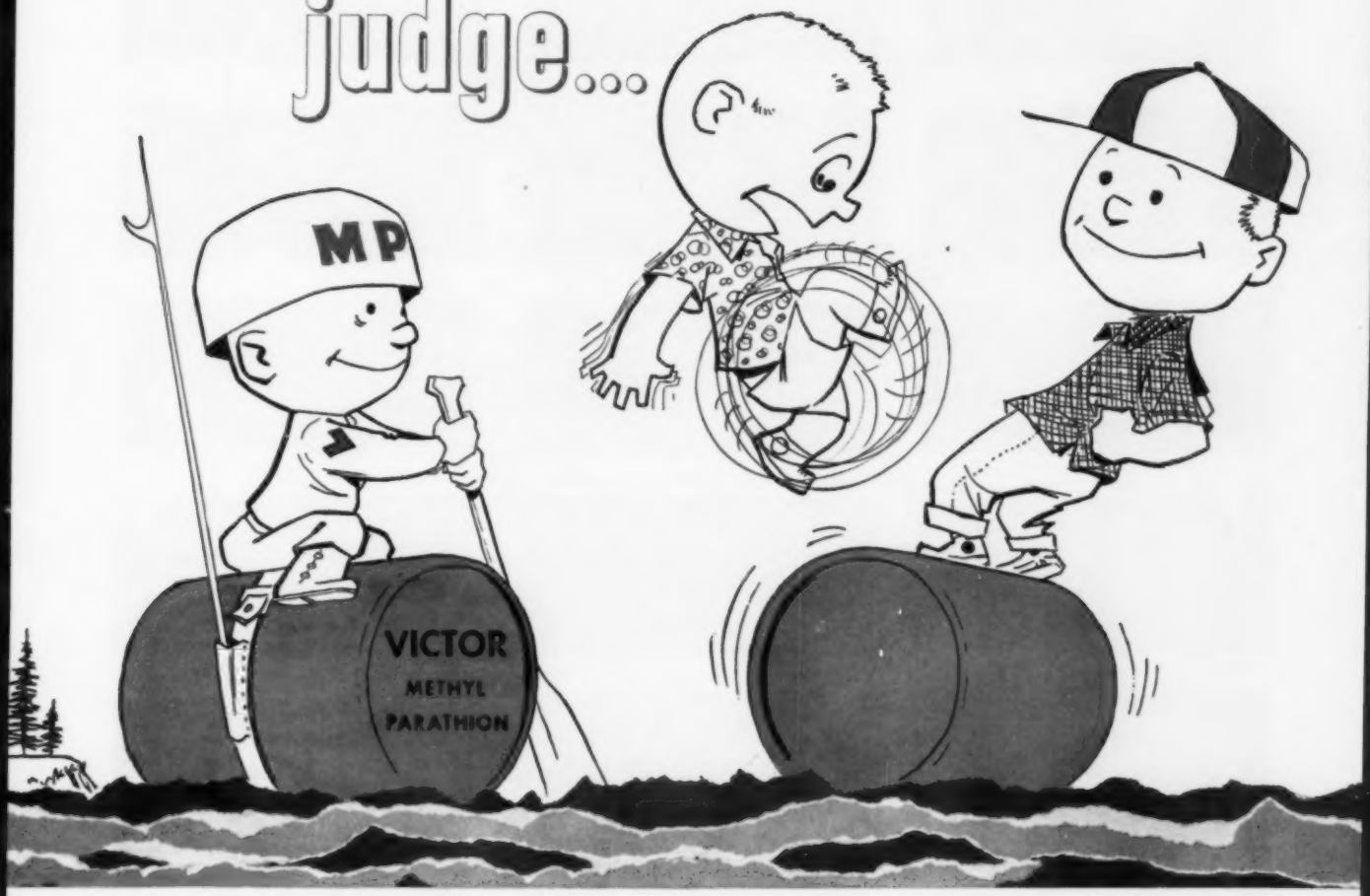
Soil Science Society of America, 2702 Monroe St., Madison, Wisc. L. G. Monthey, exec. sec.

Sulphur Institute, 1725 K St., N.W. Washington 6, D. C. Dr. Russell Coleman, president.

Weed Society of America, W. C. Shaw, secretary, Field Crops Research Branch, Beltsville, Md.

Western Agricultural Chemicals Association, Charles Barnard, executive secretary, 2466 Kenwood Ave., San Jose, Calif.

you be the judge...



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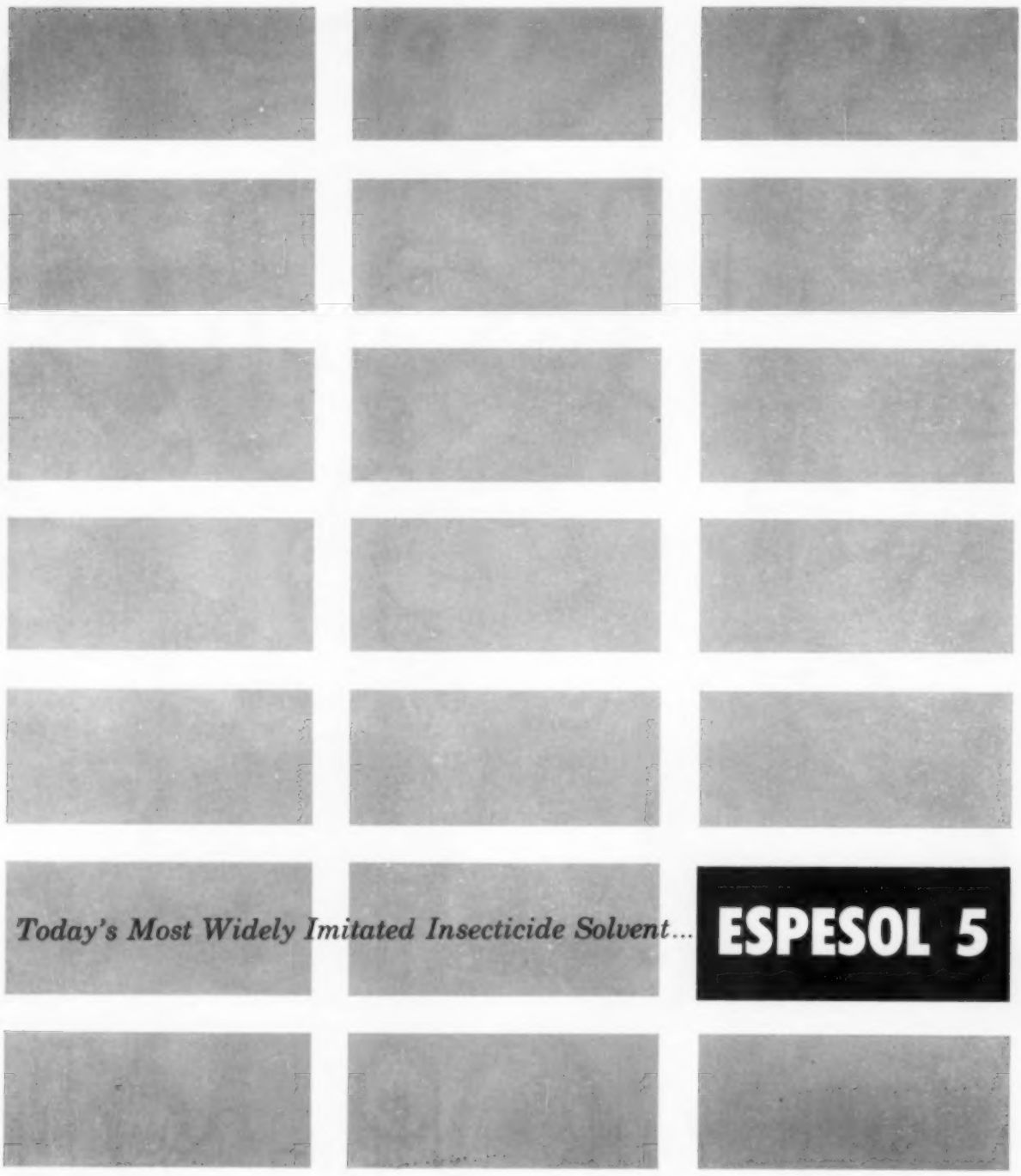

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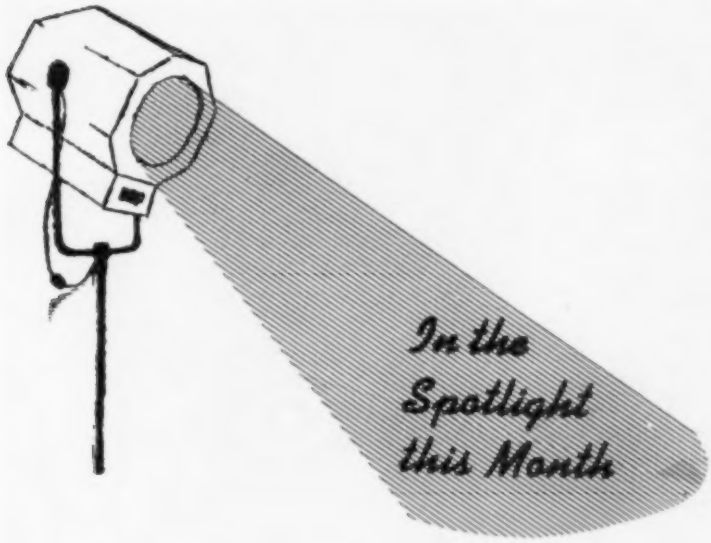

- **Insect Attractants** . . . Lures offer a rather simple means of detecting insects. Use of traps assures the early detection of an infestation, which can then be eradicated before it can enlarge,—and the traps should do the job at a very nominal cost. Several facets of this relatively new appproach to agricultural pest control are reviewed in this article, which reports on the chemical substances (natural or synthetic) which have been used as attractants. Page 37.

- **Marketing Fertilizers** . . . Thoughts and ideas on merchandising, promotion and the necessary selling tools to help a fertilizer dealer stay in business in 1960 were outlined by one speaker before the meeting of NPFI members. Fertilizer marketing dominated the entire program, as other speakers: (1) reviewed fertilizer sales approaches,—by "selling the farmer a mental concept of how he can benefit from the soil fertility plan";—and (2) called attention to the important role the fertilizer dealer plays in the farmer's decision-making process regarding fertilizer use. Page 28 and 31.

- **Fertilizer Production Control** . . . "Overages" cost the fertilizer industry some 6 to 8 million dollars a year,—but this is just one of the ways in which materials are lost in fertilizer production. Poor maintenance and housekeeping, general lack of chemical control are very costly in the fertilizer production plant. A full discussion of "in-plant-shrinkage" based on NPFI's task force investigating this problem is reported on page 43; Quality and chemical control and NPFI's project shared the spotlight with merchandising discussions at the convention, see page 31.

- **The Pesticide Formulator** . . . A plant tour of O. E. Linck & Co. in Clifton, N. J., illustrates plant practices of a successful operation,—and presents a practical operator's view of some of the industry's problems. Multiple formulations and merchandising are two avenues which can stand a lot of improvement. Page 32.

- **Launching a New Pesticide** . . . An accurate market analysis prior to commercialization of a new product is most important in the introduction of a new pesticide—Such factors as market potential, market acceptance (based on field testing, of course), and consumer awareness of the product are high on the list determining a successful marketing program. Page 41.

Market Report

Superphosphate Prices Up

A LEADING fertilizer producer is advancing superphosphate listings for all grades, effective July 1. The new schedule calls for advances of 2 cents per unit and increases of 92 cents to $2.90 per ton.

The new prices are: run-of-pile, f.o.b. Bonnie, Fla., $1 per unit, apa. (The old price was 98 cents.) For run-of-pile, f.o.b. vessel, Tampa, Fla., $1.05 per unit, apa. (The old price was $1). For coarse, f.o.b. Bonnie, Fla., $1 per unit, apa. (The old price was 98 cents.) For coarse, f.o.b. vessel, Tampa, Fla., $1.05 per unit, apa. (The old price was $1.03.) For bulk, granular, f.o.b. Bonnie, Fla., $48 per net ton. (The old price was $47.08.) For bulk, granular, f.o.b. vessel, Tampa, Fla., $50.30 per net ton. (The old price was $48.92). For bags, granular, f.o.b. Bonnie, Fla., $57.35 per net ton. (The old price was $52.25.)

Included in the announcement is a new listing for phosphatic fertilizer solutions. On a f.o.b. basis, Bonnie, Fla., the new price will be $1.39 per unit apa, as against the old price of $1.36. All prices for both the phosphatic fertilizer solutions and triple superphosphate became effective July 1.

Other July 1 price advances are: Potash muriate, 3 cents to 3½ cents per unit K_2O. Potash sulfate, 50 cents to 60 cents per ton. And phosphate rock, 50 cents per ton.

New price schedules have been listed for both industrial and feed grade urea by Nitrogen Division of Allied Chemical Corp. A new feature of the price schedule is the change from a delivered to an f.o.b. basis. This change is expected to be especially attractive to consumers close to the producing plants, since it would result in a $25 per ton saving. F.o.b. points will be in Ohio and Nebraska.

Under the new pricing, all grades of Arcadian urea fertilizer will be $98 per ton; Procadian urea feed mixture, $100 per ton; and industrial grades of crystal urea and uncoated pelleted urea $100 per ton.

Published price schedules for anhydrous ammonia all call for $84 per ton, effective Aug. 1. Supplies of ammonia are reported to be adequate for all needs.

DDT Production High

Production of DDT was higher in 1959 than ever before. (See *Agricultural Chemicals*, May, page 41.) Benzene hexachloride and copper sulfate output, however, was lower than in many years. Shortages in the supply of benzene are felt to be the cause of the lower output. Benzene requirements as a raw material used in the manufacture of synthetic organic pesticides amounts to about 35 million gallons. Estimates of the 1959 production of all synthetic pesticidal chemicals are close to the records set in 1956, when 569,927,000 pounds were produced.

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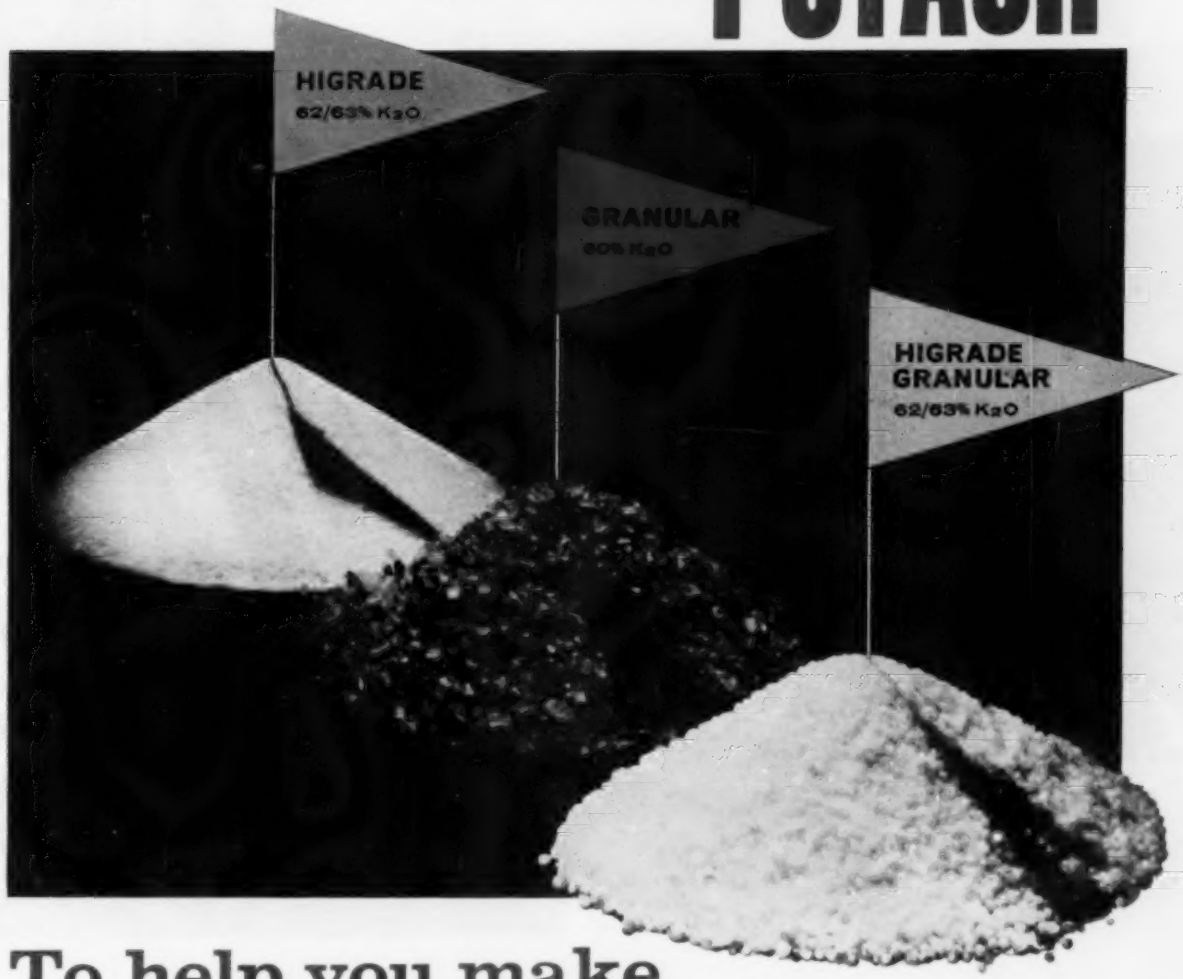

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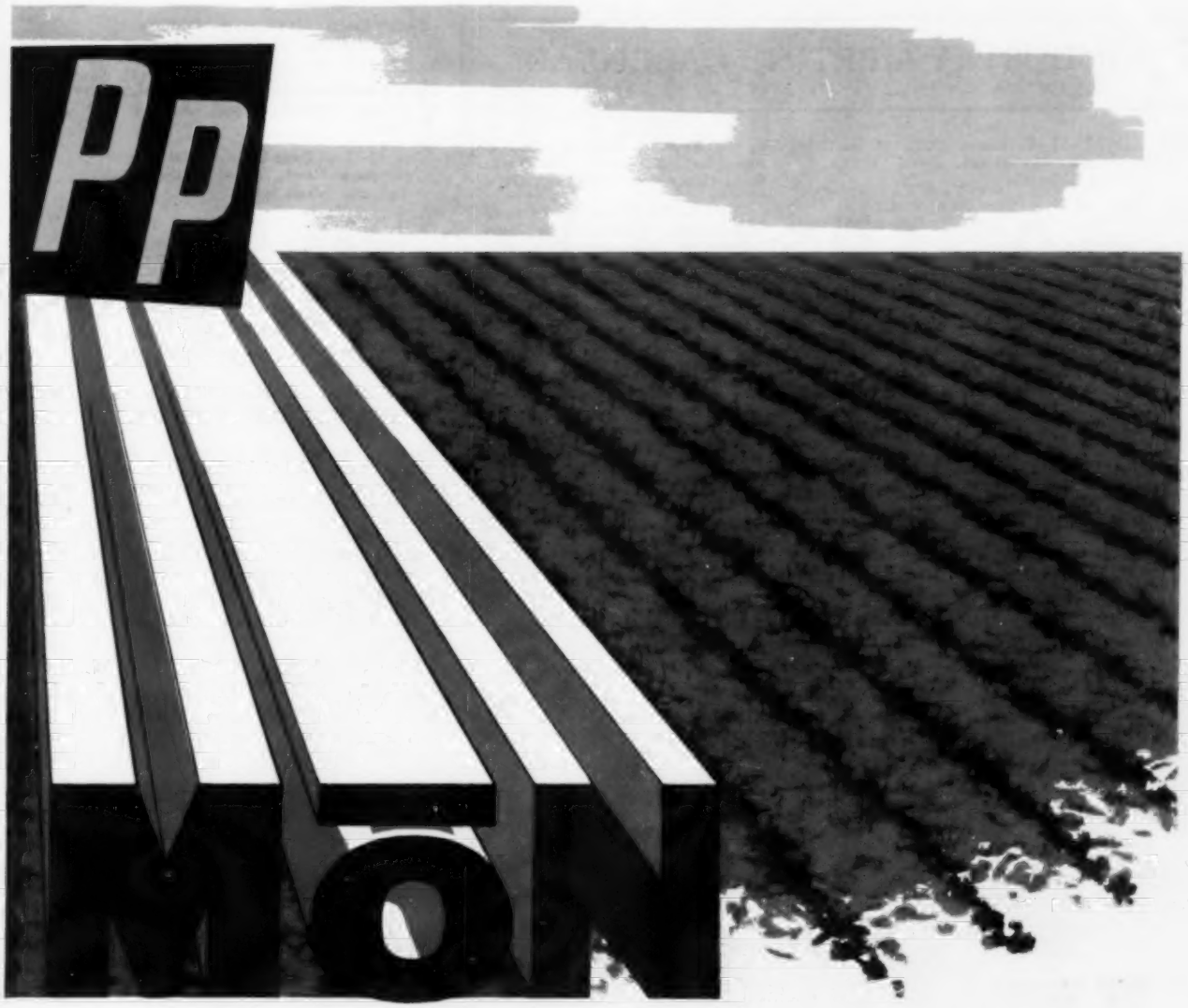

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INDUSTRY MEETING CALENDAR

July 13-15—Fertilizer Conf. of the Pacific Northwest, Hotel Utah, Salt Lake City.

July 20-21 — Sixth Annual Cornell Weed Day, Cornell University, Ithaca, N. Y.

July 27-30 — Southwest Fertilizer Conf. and Grade Hearing, Galvez Hotel, Galveston, Tex.

Aug. 7-11 — Rocky Mount Conference of Entomologists, 31st annual meeting, Cameron Pass 4-H Camp (near Gould), Colorado.

Aug. 10-11 — Northeast Regional Fertilizer Safety School, Park Sheraton Hotel, New York.

Aug. 16-17 — Midwest Regional Fertilizer Safety School, National Safety Council Headquarters, Chicago.

Aug. 17-25—XIth International Congress of Entomology, Vienna, Austria.

Aug. 25-27 — Southeast Regional Fertilizer Safety School, Wilmington, N. C.

Aug. 28-31 — Soil Convervation Society of America, 15th annual meeting, Ontario Agricultural College, Guelph, Ontario, Canada.

Aug. 28 - Sept. 1—Joint Meeting of Biological Societies, Oklahoma State University, Stillwater, Okla.

Aug. 30-31—Herbicides in Forestry Symposium, Pennsylvania State University, University Park, Pa.

Sept. 11-14—Canadian Agricultural Chemicals Association, Britannia Lodge, Muskoka, Ontario, Canada.

Sept. 11-15—138th National Meeting of American Chemical Society, With Chemical Exposition, Statler Hilton Hotel, New York.

Sept. 11-16 — American Chemical Society, 138th National Meeting, New York, N. Y.

Sept. 12-14—Entomology Society of Canada, 10th Annual Meeting with Entomology Society of Saskatchewan, Saskatoon, Saskatchewan.

Sept. 24-26 — Western Agricultural Chemicals Association, 31st Annual Meeting, Palm Springs Riviera Hotel, Palm Springs, Calif.

Sept. 27-29 — National Agricultural Chemicals Association, Annual Meeting, Del Coronado Hotel, Coronado, Calif.

Sept. 29-30 — Northeast Fertilizer Conf., Hotel Hershey, Hershey, Pa.

Oct. 5-6—Southeast Fertilizer Conf., Atlanta Biltmore Hotel, Atlanta, Ga.

Oct. 10-11 — Four-State Aerial Applicators Conf., Hotel Chinook, Yakima, Wash.

Oct. 17-18—Fertilizer Section, National Safety Congress, Chicago.

Nov. 3-4—Fertilizer Industry Round Table, Mayflower Hotel, Washington, D. C.

Nov. 3-4 — Pacific Northwest Plant Food Assn., Annual Convention, Boise, Idaho.

Nov. 13-15 — California Fertilizer Assn., del Coronado Hotel, Coronado, Calif.

Nov. 14-19—Mexican Association of Insecticide and Fertilizer Manufacturers, annual convention, Merica, Yucatan, Mexico.

Nov. 28-30 — Soil & Crop Science Society of Florida, Annual Meeting, Fort Harrison Hotel, Clearwater, Fla.

Nov. 28-Dec. 1—Entomological Society of America, 8th Annual Meeting, Haddon Hall Hotel, Atlantic City, N. J.

Dec. 5-7—Carolinas-Virginia Pesticide Formulators Assn. annual meeting, Carolina Hotel, Pinehurst, N. C.

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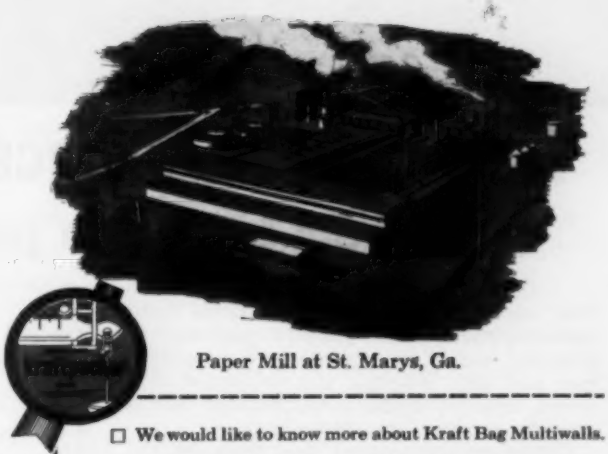

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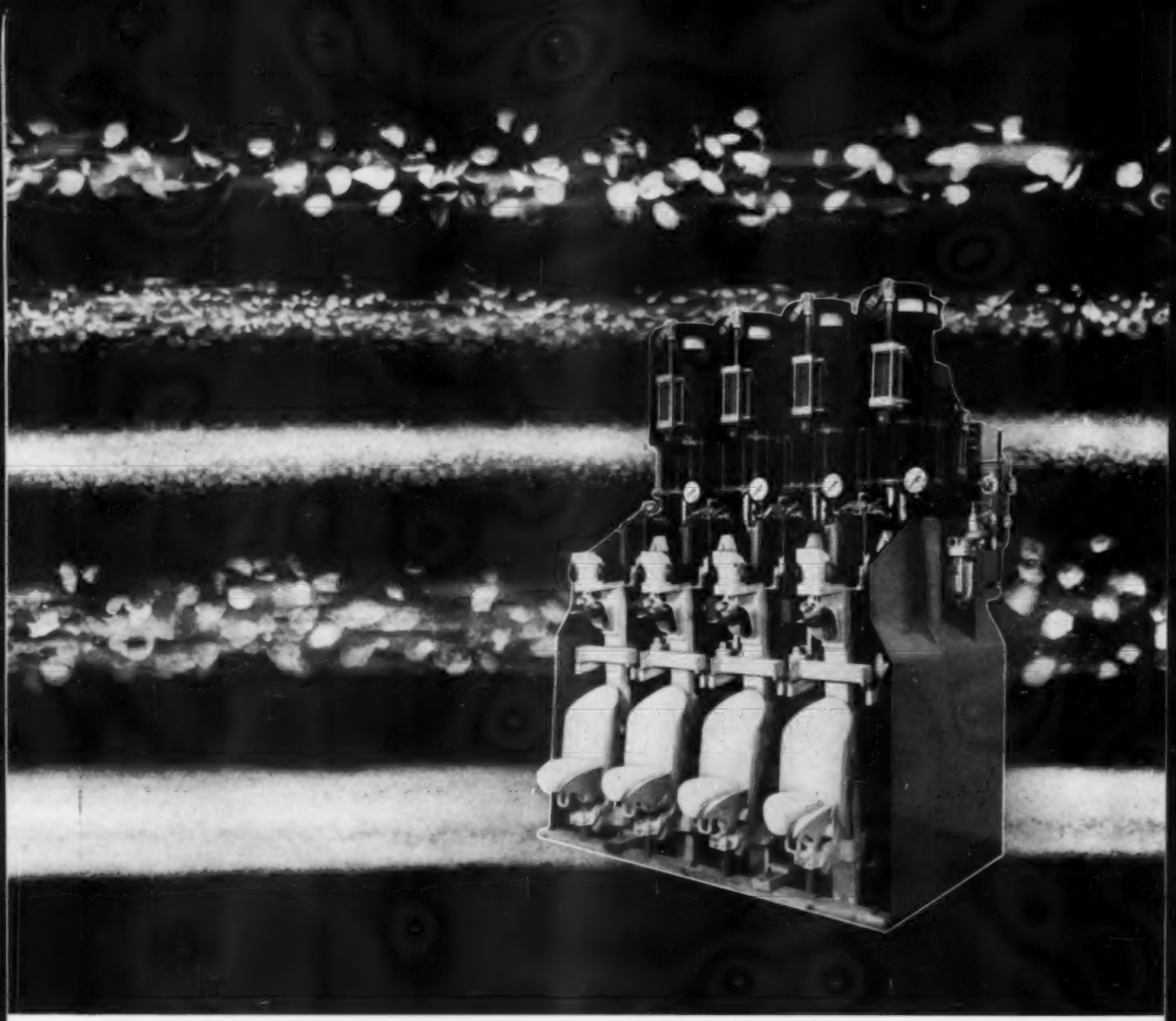

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In short, we make sure you get plenty of *service*, top *quality* always, product *dependability*, prompt *delivery* and readily available *technical assistance*—in other words—SQ_2D_2TA.

Try a test carload of the phosphates you use—and watch for that caboose-load of SQ_2D_2TA! Call us at Baltimore: SAratoga 7-3900, collect. We can ship *today* on any of the fine Davison products listed here:

W.R. GRACE & CO.
DAVISON CHEMICAL DIVISION
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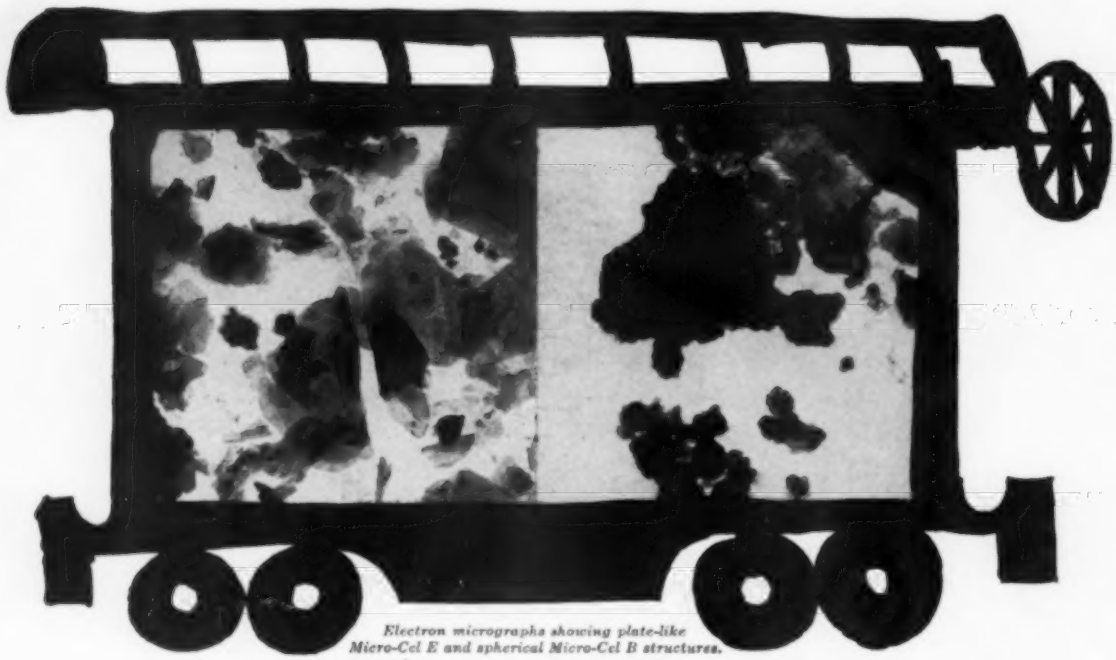


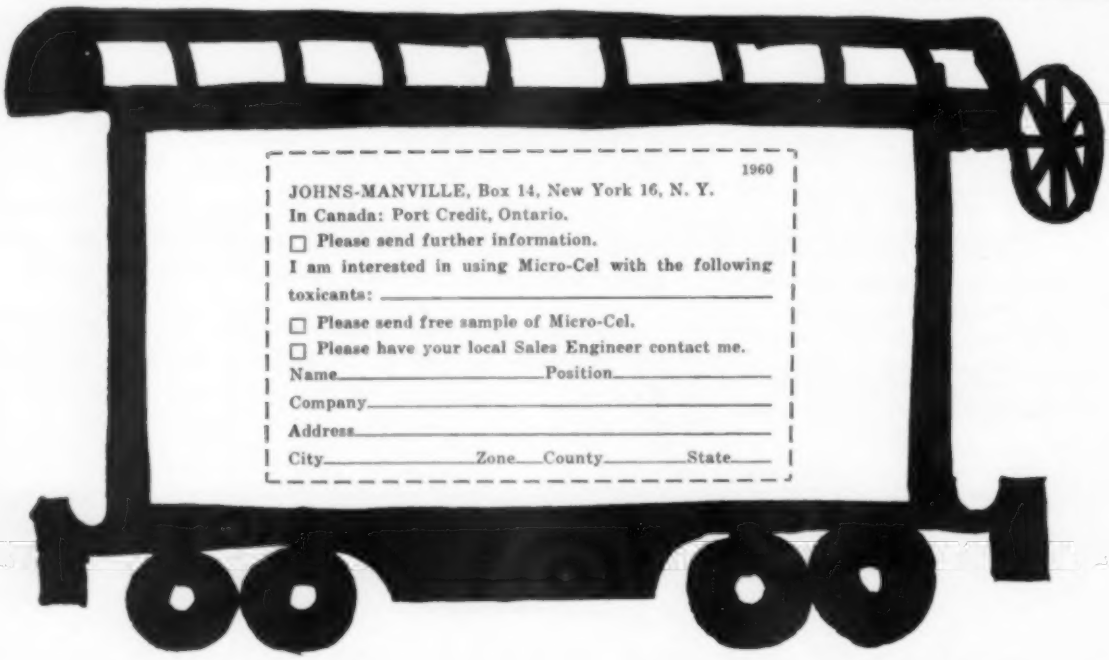
Electron micrographs showing plate-like Micro-Cel E and spherical Micro-Cel B structures.

1μ

Ship more toxicant per carload with Micro-Cel!

Micro-Cel®, Johns-Manville's inert synthetic calcium silicate, permits 75% DDT concentration. Other freight-saving, high toxicant concentrations include: 50% Chlordane, 70% Toxaphene, 50% Heptachlor, 75% Aldrin and 50% Aramite. Micro-Cel's unique structural characteristics (surface areas up to 175 sq. m/gr) reduce caking, improve flowability, increase suspendability and extend shelf life. For further information, samples and technical assistance, mail in the coupon below!

JOHNS-MANVILLE JM
Celite Division



1960

JOHNS-MANVILLE, Box 14, New York 16, N. Y.
In Canada: Port Credit, Ontario.

☐ Please send further information.

I am interested in using Micro-Cel with the following toxicants: _____

☐ Please send free sample of Micro-Cel.

☐ Please have your local Sales Engineer contact me.

Name_____ Position_____

Company_____

Address_____

City_____ Zone____ County_____ State____

In many ways

a farm indispensable...

that's why sales-minded dealers formulate with...

Triangle Brand Copper Sulfate

Triangle Brand Copper Sulfate is used

- *in fertilizers as a soil enricher*
- *in feeds as a dietary supplement*
- *in fungicides because it's compatible*

For information on formulating Triangle Brand Copper Sulfate into your farm products, write

Phelps Dodge Refining Corporation

300 PARK AVENUE, NEW YORK 22, N. Y.

An American Cyanamid Company metallurgist runs flotation test on prospector's sample, a key step in evaluating worth of phosphate deposits.

HER BUSINESS IS MAKING YOUR BUSINESS BETTER

Like all the men and women in Cyanamid's phosphate operation, her only business is phosphates for your mixed fertilizers

She's one of several hundred Cyanamid people who mine, process, research, deliver and service phosphatic materials for your acidulation and mixed fertilizer business. These people put Cyanamid's more than 40 years of phosphate experience into the kind of products and services you can use. Take advantage of both. Pick up your phone and call your Cyanamid representative.

Services you can use

Traffic Service: Cyanamid traffic specialists are ready to route and ship your orders without delays. Their knowledge can save you money and can make your operation run even more efficiently.

Technical Service: Cyanamid's staff of technical experts are on 24-hour alert. Often, what are new problems to you are solved problems to them. Make your formulation and production problems theirs. That's their job.

Sales Service: Cyanamid sales representatives are available to work with and for you in expanding present markets or in establishing new markets.

Products that serve: Cyanamid's only phosphate business is mining and manufacturing the highest quality products for your mixed fertilizer requirements.

- Florida Natural Phosphate Rock
- TREBO-PHOS® — Triple Superphosphate
- Phosphoric acid for acidulation

To manufacture fertilizers that sell ... mix with Cyanamid's phosphates and service.

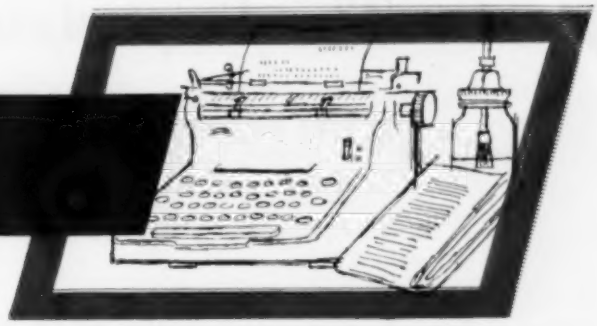
American Cyanamid Company, Agricultural Division, N. Y. 20, N. Y. *®TREBO-PHOS is American Cyanamid Company's trademark for its triple superphosphate.*

CYANAMID

PHOSPHATE PRODUCTS

CYANAMID SERVES THE MAN WHO MAKES A BUSINESS OF AGRICULTURE

EDITORIALS



A REPORT on "The Dealer's Role in Fertilizer Sales", presented by those two well-known rural sociologists, Joe Bohlen and George Beal, at the recent NPFI annual meeting, should be required reading for everyone in the fertilizer industry. As a matter of fact, those concerned with pesticide sales should be equally interested in the data and observations presented, for it would seem quite logical that the same conclusions would apply to all products in the agricultural chemical market, — pesticides as well as fertilizers.

Based on interviews with a state-wide random sample of 118 Iowa fertilizer dealers and 315 Iowa farmers, Messrs. Bohlen and Beal conclude that the fertilizer dealer "plays an extremely important role in the farmer's decision-making process regarding fertilizer use." For example, 96% of the farmers interviewed expect the dealer to be a reliable source of information about fertilizer, and in over 50% of the cases the dealer plays a major role in making the fertilizer *brand* selection for the farmer. In the light of this, it is rather disturbing then to find that, when checked for their knowledge about fertilizer, the average dealer gave correct answers to less than half the questions in a fertilizer knowledge scale. Clearly there is a big job still to be done in educating the dealer on fertilizers, — and our own experience would indicate that there is an even bigger job to be done on insecticides, fungicides, herbicides, etc., about which the average dealer knows much less than he knows about fertilizers.

Can the dealer be reached, and does he want to be reached, were two other questions that engaged the attention of investigators Bohlen and Beal. They discovered that 76% of the dealers interviewed want additional information about fertilizers, their use and application, and essentially the same high percentage report that they desire more information on new and improved sales techniques. They are anxious to sell more of the fertilizer industry's products, if some one will only try to show them how.

Many of the important factors holding back fertilizer sales are amenable to change, it was disclosed, if the dealer is approached with well planned and executed educational and promotional programs. He needs more information about the product itself, and what a high return it can be expected to yield. He needs more information on when and how to apply, and often needs to have application equipment made available to him on a contract basis. There are still many farmers, incidentally, who think they are using all the fertilizer they need, although they may be applying far less than optimum quantities. Clearly on such individuals as these a major educational job still remains to be done.

Finally, the Iowa report emphasizes the folly of price cutting in the farm supply market. When dealers were asked to name the competitive practice which is working most obviously to the fertilizer industry's long term disadvantage, by far the most frequently mentioned practice was price cutting. Bohlen and Beal offer a very telling argument against emphasis on price in fertilizer selling. It is difficult, they point out, to conceive of any situation where a dealer could save a farmer customer more than 75¢ to $1.50 an acre through cut priced fertilizer; yet if he will help the farmer in fertilizer programming through soil sampling and checking of fertilizer results, and assist in seeing that the farmer has the equipment and the knowledge to apply his fertilizer most efficiently, he may

(Continued on Page 84)

The Importance of Dealers Is Stressed At NPFI Meeting

Fertilizer manufacturers face the challenge of helping the dealer stay in business! — by furnishing know-how and tools to operate a successful farm store.

Murray C. Renick

THE fertilizer industry, as a whole, has been very neglectful in helping dealers, Murray C. Renick, president of Rolla Feed Mills, Inc., Rolla, Mo., told the 1960 convention of the National Plant Food Institute, which was held June 12-15 at the Greenbrier Hotel, White Sulphur Springs, W.Va. "Fertilizer companies have been so anxious to make sales at all costs," said Mr. Renick, "that they have sold to 'fly by night' dealers and truckers. By so doing, they have all but destroyed the dealer who can give service to his fertilizer customers. The condition is so serious at this very moment, that there is no incentive for the dealer to handle your products. Dealers in most areas can gross only one to three dollars per ton, and in some areas, there is no margin what-so-ever."

"Of all the products we as dealers sell to our farmers, I am confident that the dollars invested in fertilizer give him the best return. Yet the dealer is unable to make the proper return on the sale," Mr. Renick observed.

Various surveys on what makes farmers buy fertilizer have confirmed the important role of the dealer in the fertilizer distribution program, thus the candid observations of Mr. Renick were received with more than usual interest by the attending fertilizer manufacturers and suppliers. "Many dealers, like myself", said Mr. Renick, "are at the cross roads of decision. The right decision now may determine our future. Net profits must be our most important product in 1960 and the years ahead." He predicted that within the next ten years, 50% or more of the small farm supply dealers will be out of business, — for one thing because they do not have adequate records to guide them. "You as fertilizer manufacturers and salesmen" Mr. Renick said, "have a great, challenging opportunity to help your fertilizer dealer stay in business.

"You can help a dealership grow and prosper by furnishing the dealer know how, and showing him the necessary tools to operate a successful store.

"I sincerely believe that your salesmen should be trained so that they can give guidance to dealers who so desperately need help." he said. "Most salesmen are of little help to us dealers, as they are not properly trained. I believe that the fertilizer industry should have trained personnel, on a national or local level, so that they may hold training meetings with dealers, monthly or semi-annually, to guide them in merchandising, selling, incentive plans, credit, etc.

Describing the type dealer who "will survive and be successful in the future," Mr. Renick said: "First of all, this dealership must be larger than the farmer he is serving. Today, it is big business, big government, big farmers, big society, and big finance. This dealership must have everything the buyer needs, such as complete fertilizer service, grinding and mixing, grain bank and feeds.

Elected at the NPFI meeting were (left to right) Paul T. Truitt, reelected president; John W. Hall, elected vice chairman of the board of directors (president, Potash Co. of America); and Jefferson D. Stewart, Jr., elected chairman of the board of directors (president, Federal Chemical Co., Louisville, Ky.)

"The head of the dealership of the future must have leadership capacity, honesty, be active in civic affairs, and above all, he must be a salesman. This 'boss man' must be enthusiastic.

"Beyond the human element, the physical assets play an important role in the successful dealership. He must have a modern place of business, clean, well displayed merchandise of the highest quality, and a variety of products to service the buying public's needs."

In concluding his remarks to the fertilizer manufacturers, Mr. Renick offered the following "tools" being used at Rolla Feed Mills to get sales and measure profits as the type of assistance salesmen for the fertilizer industry should try to bring to the attention of other dealers.

1. Make a survey of your market. Find out your customer's needs. Whether it be fertilizer, seeds, wire, insecticides, or feed. Find out his livestock population, and size of his farm.
2. Departmentalization of the farm supply store to find out which items are losing money, or making money. Get rid of non-profitable items.
3. Make profit and loss statement monthly. Compare this year with last year, or several years back, so you may compare expenses and see those that are out of line.
4. Route sheets for outside retail salesmen, measuring with previous sales.
5. Route sheets for wholesale salesmen, enabling management to measure cost of all items sold.
6. Truck records to measure cost of goods hauled. Comparing with previous years.
7. Showing outside income on such items as grinding, mixing, and spraying.
8. Incentive plans for outside salesman, as well as all employees.
9. Aging accounts.
10. Credit control, interest charges etc.
11. Proof advertising with polaroid camera.
12. Cooperative advertising.
13. Measuring profits in every detail, and what they have meant to me.
14. Get employees' ideas and criticism.

Further evidence of the important role the fertilizer dealer plays in fertilizer sales to the farmer was presented by Drs. George M. Beal and Joe M. Bohlen, professors of rural sociology, Iowa State University. These speakers said that "farmers not only expect their fertilizer dealer to know the answers to their fertilizer problems, they also expect them to make fertilizer use recommendations to them." (Details on the "Dealer Characteristics Survey" presented by Drs. Bohlen and Beal, appear on page 34 of this issue.)

Institute Names Stewart and Hall

J. D. Stewart Jr. is chairman of the board and John W. Hall is vice chairman. Re-elected were: Paul T. Truitt, president; W. R. Allstetter, vice president; Louis H. Wilson, secretary; and Wm. S. Ritnour, treasurer.

THE Board of Directors of NPFI elected J. D. Stewart, Jr., of Louisville, Ky., as chairman of the Board, and John W. Hall, of Denver, as vice chairman of the Board.

Mr. Stewart is president of Federal Chemical Company at Louisville, and Mr. Hall is president of The Potash Company of America at Denver.

Other officers of the Institute, all of Washington, D. C., were re-elected as follows: Paul T. Truitt, president; W. R. Allstetter, vice president; Louis H. Wilson, secretary; and Wm. S. Ritnour, treasurer.

Members of the executive committee elected by the Board are: J. C. Denton, president of Spencer Chemical Co., Kansas City, Mo.; Mr. Hall; J. J. Lanter, president of Central Farmers Fertilizer Co., Chicago; C. T. Prindeville, vice president of Swift & Co., Chicago; W. E. Shelburne, president of Armour Agricultural Chemical Co., Atlanta, Ga.; Mr. Stewart; Mr. Truitt; Jacob White, president of the Nitrogen Division, Allied Chemical Corp., New York City; and Fred J. Woods, president of The Gulf Fertilizer Co., Tampa, Fla.

At the business meeting on June 13, members of the Institute elected 12 new members to their Board of Directors for terms expiring in June 1963, as follows: Robert E. Ashcraft, Ashcraft-Wilkinson Co., Atlanta; Arthur Wilkinson, Consolidated Mining & Smelting Company of Canada Ltd., Montreal, Canada; L. Dudley George, Richmond Guano Co., Richmond, Va.; Elwood I. Lentz, Western Phosphates, Inc., Salt Lake City; Ben D. McCollum, J. R. Simplot Co., Pocatello, Idaho; Frank Nelson, Rath Packing Co., Waterloo, Iowa; Hugo Riemer, United States Borax & Chemical Corp., Los Angeles; Ed N. Shelton, Tennessee Corp., New York City; Wayne H. Shidaker, Farm Bureau Cooperative Assoc., Inc., Columbus, Ohio; C. D. Siverd, American Cyanamid Co., New York; Tom K. Smith, Jr., Monsanto Chemical Co., St. Louis; Fred J. Woods, Gulf Fertilizer Co., Tampa, Fla.

Gene Van Deren, Bluegrass Plant Foods, Inc., Cynthiana, Ky.,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was elected to the Board to fill a term expiring in June 1961; William E. McGuirk, Jr., Davison Chemical Division, W. R. Grace & Co., Baltimore, Md., and Howard A. Parker, Parker Fertilizer Co., Inc., Sylacauga, Ala., were elected for terms expiring in June 1962.

Sell A Mental Concept—Not Fertilizer

Farmers are "longing for the fertilizer salesman who can picture his problems, his investments, his ambitions, and his goals in life," Ralph Everett, sales consultant, told the NPFI members.

"YOU don't sell fertilizer", sales consultant, Ralph Everett, told the NPFI convention, "you sell a mental concept of how the farmer can benefit from your soil fertility plan." "Probably no industry has prepared its salesmen with more technical knowledge than has the fertilizer industry," he added. "Fertilizer salesmen are more thoroughly grounded in the chemical composition of their product and the technical aspects of their business than any other sales force in history.

"All too frequently, however, the sales presentations which I have heard fertilizer dealers and salesmen present have been so full of technical 'nuts and bolts' that barriers of confusion and indecision have obscured the mental pathway to comprehension and motivation in the prospect's mind. Nearly always these barriers have been placed there unintentionally because of improper understanding of how a sale is actually made.

"Please don't misunderstand me. I am not saying that salesmen and dealers should not know their product. This is the first step in learning how to sell anything. Unfortunately, however, 95 per cent or more of the sales effort has been on the technical features of the product and 5 per cent or less on the human element of making a sale."

Mr. Everett said that farmers are "longing for the fertilizer salesman who can picture his problems, his investments, his ambitions, his goals in life," adding that salesmen who will trouble themselves to learn the processes that go on in the farmer's mind "will have a gold mine that will produce in direct proportion to the work he wants to put in."

In a discussion of "Education, —Firm Hope for Agriculture," Dr. Clifford M. Hardin, University of Nebraska and president of the American Association of Land Grant Colleges told the 1960 convention that "we must continue to strive to improve the efficiency of agricultural production."

PHOTOS ON OPPOSITE PAGE

(1) J. Murray, T. A. Mitchell, R. R. Burns, all of Tennessee Corp. and D. E. Wolf, E. I. duPont de Nemours Co.

(2) R. Coleman, The Sulphur Institute; G. M. Barley, Diamond R. Fertilizer Co., Winter Garden, Fla.; F. E. Lewis, Jefferson Lake Sulphur Co.; and J. L. Sanders, Mississippi River Fuel Corp., St. Louis.

(3) H. Riemer, and F. Corkill, both of U. S. Borax & Chemical Corp.; W. Alstetter, National Plant Food Institute; and C. M. Henderson, United States Steel, Pittsburgh.

(4) W. Sackett, Sr., A. J. Sackett & Sons; C. O. Totman, and J. E. Totman, Summers Fertilizer Co. and J. E. Nunnally, Cotton Producers Association.

(5) W. Jacobi, Union Bag-Camp Paper Co.; B. Gillette, Texas Gulf Sulphur Co.; and J. C. Bauman, Union Bag-Camp Paper Co.

(6) H. S. Ten Eyck, International Ore & Fertilizer Corp.; H. J. Wehrenbrecht, Bemis Bro. Bag Co., New Orleans; and Mr. and Mrs. A. Taylor, Chemical & Industrial Corp., Cincinnati.

(7) J. W. Harding, Federal Chemical Co.; E. Bennett, Nebraska Fertilizer Co. and G. E. Garland, Texaco Inc.

(8) Nelson White, International Minerals & Chemical Corp.; J. Stewart, Federal Chemical Co.; John Hall and R. B. Lenhart, Potash Company of America.

(9) J. Whittington, Olin Mathieson Chemical Corp.; F. Litty, Northern Chemical Industries, Searsport, Me.; A. Spillman, Fertilizer Manufacturing Cooperative, Inc.; and G. Clines, Davison Chemical Co.

(10) S. R. Clement, Monsanto Chemical Co., St. Louis; L. Nelson, and A. Dickinson, Freeport Sulphur Co.

Additional NPFI Meeting Photos will appear in the August issue.

NPFI Control Project

Overformulation, inefficient operation, poor maintenance, lack of quality and chemical control are just a few of the loopholes which contribute to an annual industry loss of some 10 million dollars.

THE fertilizer industry loses some 6 to 8 million dollars a year as "overages," reported Vincent Sauchelli, NPFI technologist, in introducing the subject of chemical and quality control at a panel discussion of this very expensive industry problem. "Can something be done to reduce this loss?" asked Dr. Sauchelli. NPFI thought it could, he reported, and about three years ago NPFI organized a collaborative study in participation with the Association of Official Agricultural Chemists and the Association of American Fertilizer Control Officials. Some of the findings and investigations of this NPFI project were presented at the 1960 NPFI convention.

Dr. Sauchelli explained that the NPFI project was organized around the concept that the cost of over-formulation, as currently practiced by industry, could be substantially reduced if the precision and accuracy of sampling and analytical procedures in state and industry laboratories could be improved. The following are additional comments by Dr. Sauchelli in an analysis of chemical control difficulties.

"The industry's product is relatively inexpensive or 'cheap as dirt' — someone has said. The average selling price is around 3 cents a pound or less. Not many things can be bought today at that price. The industry is forced to operate on a lower level of product purity so as to provide farmers with low-cost fertilizers.

"The chemical control laboratory has a tough job. It concerns itself with bulky, fairly crude materials prepared in large volume. These materials vary in particle size, density, shape and composi-

(*Continued on Page* 82)

Above: O. E. Linck
Left: Bob Linck

O. E. Linck Co.

Decorations Line During "Off Season" Keeps Formulating Equipment Active

The filling line, folding and packing equipment, bagger, etc., used for packaging agricultural pesticides and fertilizers during the growing season, find ready application in the packaging of Christmas decorations at O. E. Linck Co., Clifton, N. J.

WITH the spring behind us, and the summer and "bug" season in full swing, pesticides have been moving rapidly from the formulator's plant through the distributor and jobber, — and on to farms and gardens. For about eight months of the year (January through July), pesticide formulators like O. E. Linck & Co. in Clifton, N. J., concentrate on making pesticides . . . and put all equipment into pesticide production. During the remaining four months, many formulators switch to another product to carry them over the "off season". During this period, O.E. Linck supplies a market completely foreign to agricultural chemicals,—the manufacture of Christmas decorations and specialty items, such as glitter paints, magic drawing tubes, and styrofoam decorative figures.

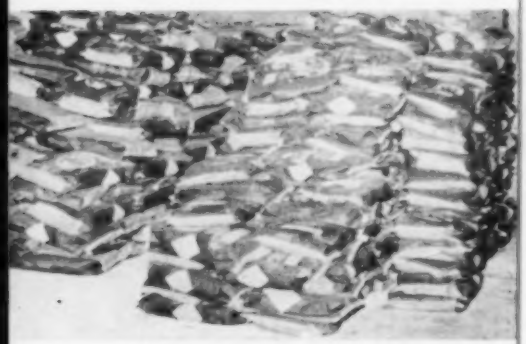
The filling line, folding and packing equipment, bagger, etc., used in packaging agricultural pesticides and fertilizers during the pesticide season finds ready application in the packaging of Christmas decorations, — thus this equipment is always in operation. Mixing and storage tanks are also adaptable to processing materials other than pesticides.

Pesticide formulating equipment at the Linck plant is relatively simple. The liquid formulating plant consists of: a battery of 5000-gallon storage tanks, mixing tanks, and a filtering unit. The dry plant includes a ribbon blender, mixer, and mill. Standard scales, filling line, bagging equipment, etc., complete the installation. As is usual in an insecticide plant, production is batchwise, and many of the operations, such as box folding, packaging, filling, etc., are done by hand.

O. E. Linck specializes in products for lawn and turf. They also offer chemicals for the farmer, specialty items for the household insecticide industry, rodenticides and ant products for the pest control operator, and chemicals for orchardist and nurseryman.

Package sizes range from a 1½-ounce trial size of "Tat-Mo-Go" rodenticide to a 100 pound drum of herbicide (Dimet plus 2,4-D and disodium methyl arson-

Linck's Chickweed Killer is shown being packaged in pint bottles for lawn and garden use. Women in photo are attaching labels. The same personnel and equipment package Christmas decorations during the fall.



ate). The Linck agricultural product line is rounded out with fertilizers, sold in 4½-pound containers to the home gardener, or in bulk directly to garden centers, golf courses, etc.

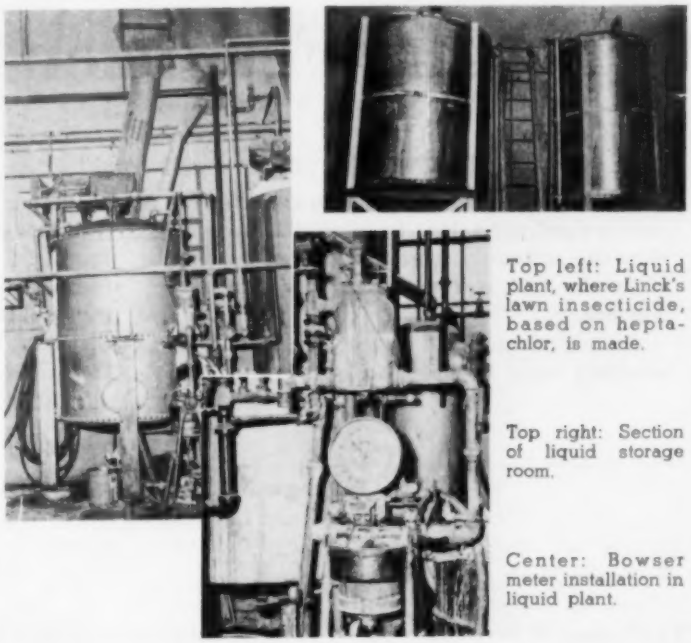
O. E. Linck fertilizer products include a 46% nitrogen water soluble fertilizer, in 4½-pound and 80-pound packages; a chelated iron; and a specialty product, "Stayz-Green" which includes a bright, green grass paint to color grass, which might be brown because of disease, weather or winter dormancy. O. E. Linck was one of the developers of the latex-type paint, which is based on Monsanto's Lytron 680, a latex binder.

Other Linck specialty items include a neutralizer (to neutralize spray equipment), a wallpaper remover, a surfactant formulation (to be added to water for fire-fighting), and a plastic tree dressing.

The Linck agricultural pesticides include: chlordane formulations (dusts, emulsions, wettable powders); heptachlor lawn insecticides; DDT formulations for household insecticides, orchards and greenhouses; phenylmercure-thylenediamine-based lawn fungicides, and a BHC formulation for mites. Linck's best known pesticide is a pre-emergence crabgrass control product, Di-met, offered in about six different formulations and packaged in some 20 different sized containers.

(*Continued on Page* 87)

Production Equipment At The O. E. Linck Plant

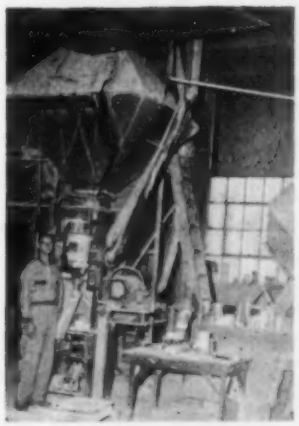


Top left: Liquid plant, where Linck's lawn insecticide, based on heptachlor, is made.

Top right: Section of liquid storage room.

Center: Bowser meter installation in liquid plant.

Dry blending plant milling installation.



Dry blending plant bagging equipment.

Ribbon mixer in the dry blending plant. Among the Linck pesticides are: chlordane formulations; heptachlor lawn insecticides; DDT formulations for household use; and a BHC formulation for mites.

The Dealer's Role In Fertilizer Sales

Dealers can and are playing an effective role in fertilizer sales. In general, however, they are unhappy over the lack of support from the fertilizer manufacturer and distributor.

Price cutting is still one of the sore spots working most to the disadvantage of the industry. If dollars are to be the criterion, a dealer can help the farmer make an additional $5 to $10 an acre from proper fertilizer use (and himself keep a respectable margin) instead of trying to "sell" price discount, and thus "save" the farmer only from 75¢ to $1.50 an acre.

by George M. Beal and Joe M. Bohlen*

Rural Sociologists
Iowa State University

THE future of the fertilizer industry depends on securing optimum use of fertilizer by the farmer. There is general agreement that there is a tremendous potential for increased fertilizer use. Probably the biggest potential is helping farmers increase their use of fertilizer to a more nearly optimum level. In many areas the majority of farmers could be using three times their present amounts economically.

Obtaining optimum fertilizer use by farmers is a complex problem, with many organizations, agencies and institutions involved. Fertilizer manufacturers, mixers, distributors and dealers have a role to play, as do educational institutions and agencies, such as Extension, SCS and Vocational Agriculture. This paper has as its major focus one important aspect of this complex problem – the fertilizer dealer.

Research evidence points up the important role that the fertilizer dealer plays in the farmer's decision-making process regarding fertilizer use. For instance, 96 percent of the farmers expect the fertilizer dealer to be a reliable source of information about fertilizer. In over 50 percent of the cases the dealer played a major role in making the fertilizer *brand* selection for the farmer.

Sales Volume

Fertilizer sales volume ranged from $500 to $330,000 for the various dealers interviewed, with an average of $40,155. Twenty-five percent of the dealers sell less than $10,000 worth of fertilizer – 60 percent sell less than $31,000 volume. Farmer dealers had average sales of less than $6,000. Twenty-five percent sell over $50,000 worth of fertilizer. Twenty-six percent of the dealers sell 73 percent of the fertilizer in Iowa. On the average, *fertilizer sales* make up approximately 14 percent of the total volume of sales of the dealer.

The dealers' average gross profit margins (mark-up from purchase price) varied from one to 35 percent, with an average mark-up of 9.33 percent. This compares with 14.4 percent average mark-up in other departments of their business. Gross profits on fertilizer ranged from $110 to $39,600. The average was $4,000. Twenty percent of the dealers had a total fertilizer gross profit of under $500.

Dealer Attitudes and Knowledge

Role of fertilizer department

- 26 percent evaluated their fertilizer department as "a good money-maker in itself"
- 31 percent evaluated their fertilizer department as an *important* customer service
- 26 evaluated it as just another customer service
- 15 percent stated that it was "not a money-maker, but they had to carry fertilizer to compete with other businesses"

Profit

- 71 percent evaluated the margin of profit on fertilizer as inadequate

*Summary of a presentation given at annual meeting of National Plant Food Institute, White Sulphur Springs, June 14, 1960.

Most of the data presented are taken from Iowa Agricultural Experiment Station Project No. 1352, a cooperative project with the Agricultural Economics Branch of the Tennessee Valley Authority. These data are based on interviews with: (1) a state-wide random sample of 118 fertilizer dealers, (2) a stratified purposive sample of 20 dealers drawn from the 118 dealer sample that were reinterviewed in depth, and (3) a state wide random sample of 315 Iowa farmers, farming more than 40 acres.

The fertilizer business is . . .

31 percent said that the fertilizer business was *poor*

23 percent said it was *average*

22 percent said the fertilizer business was *"excellent"*

5 percent said it *"had great potential"*

19 percent gave other answers

Dealer role with farmer

Forty-two percent of the dealers saw their role with farmers as just "a seller of needed goods and services" rather than a consultant to the farmer on farming and fertilizer matters. A southern state found even a smaller percent who saw themselves as consultants on farming and fertilizer matters.

Knowledge about fertilizer

On the average, dealers gave correct answers to less than half of the items in a fertilizer knowledge scale.

From the above findings it is obvious that there are many negative attitudes and opinions held by dealers toward the fertilizer business, but most of those attitudes and opinions can be changed. Understanding these attitudes and the basis for them should enable the fertilizer industry to take more direct measures to remove the causes of these attitudes or change them. These attitudes are not held by all dealers. Some dealers are susceptible to change, and many dealers have very positive attitudes toward the fertilizer business.

Untapped Potential of the Dealer

The findings presented demonstrate that some dealers can and are playing an effective role in fertilizer sales. A number believe that the fertilizer business is "excellent," that profit margins are "adequate" and say they are pushing fertilizer as hard as they can. These factors are all related to larger volume sales and relatively high gross profits — for instance, those who say they are pushing fertilizer as hard as they can have three times higher gross profits than the average dealer. The fertilizer industry must ask itself if it is willing to help up-grade dealers so that they will do a more effective job in increasing farmer fertilizer use to more nearly the optimum level. It also appears that, to date, the industry has not answered this question in a definitely positive fashion. When the state-wide sample of dealers were asked what help they were receiving from their fertilizer distributor or manufacturer, the following answers were given: slightly over half stated they were receiving *no* help; 25 percent said they were receiving some help on advertising; 10 percent stated they were receiving help on financing; and 5 percent mentioned help on actual selling. Manufacturers and distributors may have a different perception of the help they are providing. But the figures presented represent what help the average dealer *believes* he is getting.

An attitude of receptivity seems to exist among many dealers. They are asking for help from the industry. If the dealer is to be motivated to "push" fertilizer, however, it is going to take a well planned and implemented program.

Farmer-Customer Point of View

Farmers not only expect their fertilizer dealer to know the answers to their fertilizer problems, they also expect them to make fertilizer use recommendations.

1. 96 percent of the farmers said they thought their fertilizer dealer should be a reliable source of information about fertilizer;
2. 79 percent said they expected their fertilizer dealer to recommend the method by which they should apply the fertilizer;
3. 60 percent said they expected their fertilizer dealer to recommend the amount of fertilizer to apply;
4. 69 percent said they thought their dealer should recommend the analysis of fertilizer for them to use.

In the state-wide farmer study the respondents were asked to complete the sentence, "I wish my fertilizer dealer would. . . ." Of the farmers who had specific suggestions for their dealers, 38 percent said "reduce prices." However, *54 percent* suggested such things as: provide more services, give me more information, and sponsor test plots and demonstrations.

The farmers were asked if there were any services offered by dealers that were so important that this availability, or lack of it, would cause them to change dealers. Sixty-nine percent replied "yes," 19 percent said "no." Those who replied "yes," (69 percent) were asked what services would cause them to change dealers. A number gave more than one answer: 51 percent mentioned soil testing services, 29 percent mentioned spreading services, 17 percent mentioned basic fertilizer information, and 11 percent mentioned credit.

Farmers were given an array of 20 services and asked to check, "What services offered by fertilizer dealers are important to you?" The farmers were then also asked whether or not their dealer (s) offered the service checked. There were major areas of relatively great discrepancy—many farmers thought a specific type of service was important but it was not being

offered by their dealers. The greatest discrepancy was on fertilizer test plot demonstrations—30 percent of the farmers ranked it as a service important to them and only 6 percent of their dealers were offering it. The next greatest discrepancy occurred in the area of soil testing—showing the farmer how to take soil samples and mailing in soil samples for them. Fifteen percent more farmers checked this as an important service than stated their dealer offered it.

When farmers were asked what factors limited their use of fertilizer the following were among the important answers given: risk and uncertainty involved in use; lack of necessary application equipment; low return for dollar invested; problems with handling and applying; landlord attitude; dissatisfaction with past experience; not enough information on fertilizer, and "I use all the fertilizer I need *now*." All of these limiting factors are amenable to change by properly planned and executed educational and promotional programs.

"Large Volume" Fertilizer Dealers

Figures developed in the study were subjected to special analysis to disclose what characteristics are typical of the dealer who sells a considerably "greater than average" volume of fertilizer. The differences in characteristics between "large volume" dealers and the remaining dealers broke down as follows:

Twenty-six percent of the dealers in the study accounted for 73 percent of the fertilizer sold. These 26 percent averaged approximately $107,452 in fertilizer sales. The remaining 74 percent averaged approximately $14,363.

The larger volume dealers, the 26 percent that sold 73 percent of the fertilizer, had the following characteristics when compared with the remaining 74 percent.

1. They are more progressive—more willing to adopt new sales, promotional and merchandising techniques.
2. They have higher knowledge about fertilizer and fertilizer use.
3. A greater percent see their role as being a consultant to the farmer on fertilizer matters rather than "just a seller of needed goods and services" or "a friend of the farmer."
4. They think they should attempt to influence the farmer on amount and analysis of fertilizer to apply and how to apply it.
5. They are more oriented to the importance of science in modern day farming.
6. They maintain higher fertilizer mark-ups — 10.2% compared with 8.2% for the remaining dealers.
7. They have a much larger total volume of business.
8. They offer more "soil sampling services"; take soil samples for farmers, send samples to soil test laboratories, and interpret soil test results for farmers.
9. They offer more bulk spreading services.
10. A greater percentage offer fertilizer clinics and fall fertilizer demonstration evaluations with a specialist present.
11. A greater percentage call on farmers as a part of their "promotional" program.
12. A greater percentage use mass media promotional devices; advertising, "throwaways" and "stuffers," and fair displays.
13. More of them offer volume discounts, seasonal discounts and self-haul discounts.
14. Slightly *fewer* of them offer credit as a service — although over 75 percent of each group offer credit.

The day of the "order-taking" salesman is passing out of the picture. The alternative may be the well trained specialist, who can give expert advice on business and farm management and sales and educational programs as well as fertilizer and fertilizer use.

Progressive Dealers

In the dealer study a scale was developed to measure the dealer's attitude toward the adoption of new services, sales and merchandising techniques. Being progressively oriented to the new service, sales and merchandising techniques was shown to be positively and significantly related to:

1. Total gross profit made on fertilizer;
2. Profit margin made on fertilizer;
3. Knowledge about fertilizer.

The more progressively oriented dealers:

1. Sold significantly more fertilizer;
2. Offered more educational services such as fertilizer clinics, test plot demonstrations and soil sampling, sending in soil samples and interpreting soil samples;
3. Offered more fertilizer spreading services;
4. Believed the farmer-customer wants them to be a consultant on fertilizer matters and think they (the dealer) should try to influence the farmer in what analysis to apply, how to apply it and how much to apply.

Soil Testing

One of the services long suggested by both industrial and edu-

(*Continued on Page* 84)

Insect Attractants Are Taking Hold

Some of the new approaches to insect control are based on well-known patterns of insect behavior. Insects need food and water. They seek out mates, and the mated females then search for a place to oviposit. Odors, scents, and other airborne stimuli guide many species in their quest to fulfill their needs. Taking advantage of these behavioral patterns could help man to combat insects of economic importance.

Lures offer a remarkably simple means of detecting insects. They can increase the efficiency of insecticide applications because treatments need be applied only where insects are caught and only as long as they are caught. The chemist has not come to the end of his problem after identifying the lure, however. It still is necessary to develop a commercial synthesis — one that will enable procurement at a reasonable price.

by Morton Beroza
Entomology Research Division,
Agricultural Research Service,
U.S.D.A., Beltsville, Md.

THE quality of our farm products has never been higher, their production never greater. In no small measure, insecticides are responsible for this happy picture. But rumblings of trouble on the entomological front are becoming more frequent. We hear of insects becoming resistant to insecticides and of new chemicals being rushed in to maintain control. Heavier applications, more potent chemicals are in themselves not the answer. New approaches are needed, and these are being advanced and studied.

Some of the new approaches are based on well-known knowledge of insect behavior. Insects need food and water. They seek out mates, and the mated females then search for a place to oviposit. Odors, scents and other airborne stimuli guide many species in their quest to fulfill their needs, and nature has equipped some with highly developed and very efficient olfactory apparatus. We should like to take advantage of these behavioral patterns to help us combat insects of economic importance; thus the very trait that enables a species to survive or thrive in a hostile environment may prove to be its "Achilles' heel." For this reason, U. S. Department of Agriculture entomologists and chemists have pioneered on a large scale the use of insect attractants (*2, 10*), an approach that has already proved its worth.

This paper describes several facets of this intriguing line of endeavor. It deals mainly with the use of definite chemical substances, natural or synthetic. Foodstuffs or their derivatives—e.g., starches, protein hydrolyzates, fermenting mixtures, bacterial cultures—are mentioned, but not discussed in detail here. Some of these items have been discussed in previous issues of this Journal (*16, 19*). A comprehensive review of recent developments in chemical attractants for insects has just been published (*9*).

How Lures May Be Used

LURES offer a remarkably simple means of detecting insects. A trap is baited with a lure; the responding insect is caught, and thus signals the presence of his species. Several of the insect lures discovered by scientists in the Entomology Research Division are now standing guard at our borders, mainly at ports of entry. The traps assure the early detection of an infestation, which can then be eradicated before it can enlarge; and the traps do the job at a very small cost. Should an infestation become established—as happened with the Mediterranean fruit fly (*Ceratitis capitata*) in Florida in 1956 (*17*)—the value of this technique becomes even greater. Attractants can increase the efficiency of insecticide applications because treatments need be applied only where insects are caught and only as long as they are caught. Money is saved because insecticides are not wasted; residue problems are held to a minimum. Before the end of 1957, the Mediterranean fruit fly was eradicated from the million acres found infested. By this same means, the spread of the gypsy

moth (*Porthetria dispar*) from the New England vicinity has been prevented (*18*).

Through the use of lures to indicate an insect population, the timing of insecticide applications may be guided to give maximum effects.

Lures have also shown some promise in direct control of insects. Our Honolulu fruit fly laboratory obtained excellent control of the oriental fruit fly (*Dacus dorsalis*) by spraying an insecticide plus methyleugenol, a highly specific lure for this species (*20*). This procedure may provide a means of eliminating a harmful species without affecting other insects or wildlife and thus upsetting nature's balance. Work in this direction is being expanded by members of this Division. Also scheduled for exploration is the use of chemical antifertility agents with a lure (*15*). Insects made infertile by this combination would be more damaging to their species than if they were killed, since they would seek out and mate with other members of their species and thereby prevent them from propagating.

Kind of Lures Needed

AT one time entomologists, marveling at the ability of some insects to find mates, postulated all sorts of means of communication between the insects. Now we know that the females of certain species, especially moths, emit substances attractive to males of their own species. These substances are potent, highly specific, and effective at a great distance—just the kind of materials we need to detect injurious insects. Thus far, the lure of the female gypsy moth is the only natural sex attractant being used on a large scale for this purpose. The isolation of this lure in pure form, and much of its chemical structure, have recently been reported by Jacobson and co-workers (13) of this Division.

Certain synthetic chemicals, which to our knowledge do not exist in nature, have been found to be potent insect lures. Like the sex attractants, they are highly specific, potent and effective at distances up to one-half mile; furthermore, they attract only males. Compounds attracting females in laboratory tests, for some unknown reason, do not attract in the field.

Weak lures are useful, too. Once located, an insect can often be controlled more effectively with a combination of lure plus insecticide, than with insecticide alone. Use of the combination makes it unnecessary to obtain complete coverage with the insecticide, since the insect comes to the lure. In this application, specificity and long-range action are not important, and the inexpensive food-based lures, which are usually easily found, work well. The weak lures can therefore supplement the more costly specific ones.

Two Main Means of Finding Lures

ISOLATION.—The isolation approach, involves the isolation and identification of the active ingredient of materials known to be attractive. The attractant may be the sex scent of an insect, as already mentioned, or it may be a host plant or animal.

The chemist faces many problems in his attempt to isolate the active principle. At the outset he must develop an extraction procedure. It helps to know which part of the natural attractant harbors the effective fraction. In a plant it may be the flower, the seed, the stem, or the root. The benzene extract of the last two abdominal segments of the gypsy moth is attractive, but a similar extract of the whole moth is not. Thus the elimination of some of the unattractive material already constitutes a partial purification. Natural attractants may be attractive only during one stage of their existence. Sometimes the crude material can be used. This is not a very inviting prospect. Such crude materials are variable in composition, variable in attractiveness. Frequently, they are unstable. Methods of assaying the attractive qualities are seldom reliable, if available at all.

The step from the active fraction to the pure chemical is a big one. The chemist may have to call on every device in his chemical repertoire to get by this hurdle. Lack of stability, high volatility, or the presence of only micro amounts of the chemical may hinder him.

Once isolated, the pure lure must be identified. Isolation and identification of natural products can be time-consuming. For example, some German workers (5) recently reported the identification of the silkworm moth's sex lure, but only after research over a 20-

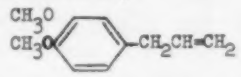
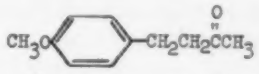
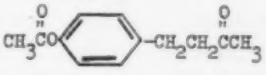
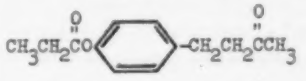
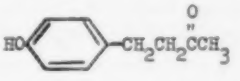
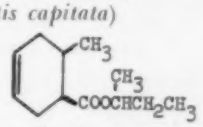
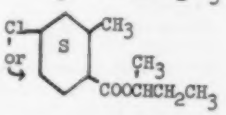
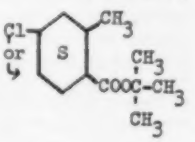
year period. A serious difficulty is encountered when the amount of chemical isolated approaches the vanishing point, and all too often this is the case. Such difficulties are magnified when the chemical structure of the lure is complex. In former years, classical-type analyses were the only recourse, but with newer techniques and instrumentation—such as paper and gas chromatography, infrared and ultra-violet spectrophotometry, X-ray diffraction, and mass spectrometry—a wealth of information may be collected from a minute amount of material, and this material may often be recovered without loss. Eventually degradation studies are pursued. The chemist splits the lure in various ways, and tries to isolate and identify the fragments. From the pieces, he attempts to deduce the original structure.

The chemist has not come to the end of his problem after identifying the lure. He wants to synthesize it, but may not be able to. With all our wonderful advances in synthesis, nature is still far ahead of us. But if the synthesis defies us, we can make simpler analogs and test them. Possibly on the basis of these results, the chemist can decide which grouping in the molecule imparts the attractive quality. This knowledge can be invaluable in guiding further efforts to prepare a more potent lure.

With a means of preparing the lure on hand, it is still necessary to devise a commercial synthesis—one that will enable procurement of the attractant at a reasonable price.

VOLUME SCREENING.—We have had more success in finding lures by the second route—what we call volume screening. We test a large number of compounds, get a lead—i.e., a weak attractant—and obtain or synthesize related compounds in an attempt to get a stronger lure. We first test all materials reputed to be lures and then any suitable chemical we have on hand or can get. Best results have

Table 1. Insect Lures

Structure of Chemical	Type	Common Name	Reference
Oriental fruit fly (*Dacus dorsalis*)			
	Ether	Methyleugenol*	(*11*)
Melon fly (*Dacus cucurbitae*)			
	Ketoether	Anisylacetone	(*1*)
	Ketoester	Cue-lure*	(*3*)
	Ketoester	—	(*3*)
	Ketophenol	—	(*3*)
Mediterranean fruit fly (*Ceratitis capitata*)			
	Ester	Siglure	(*6,7,8,21*)
	Ester	Medlure	(*4*)
	Ester	Trimedlure*	(*4*)
Unknown	Sesqui-terpene	Angelica seed oil	(*22*)
Gypsy moth (*Porthetria dispar*)			
$CH_3(CH_2)_{13}$–CHOHCH$_2$OH	Alcohol	—	(*12,14*)
$CH_3(CH_2)_{13}$–CH–CH_2 (O)	Epoxide	—	(*12,14*)
acetoxyhexadecen-1-ol* (natural sex lure)	Unsaturated alcohol	—	(*13*)
Silkworm moth (*Bombyx mori*)			
$CH_3CH_2CH_2CH$=CH–CH=CH–$(CH_2)_8CH_2OH$*	Unsaturated Alcohol	—	(*5*)

*Best lure available for species.

been obtained by screening as many chemicals of as many different types as possible.

We also screen certain extracts of plants or animals, essential oils, foods, waste products, and other materials of indefinite composition. These are of lesser interest in the volume screening approach, as there can be no follow-up without isolation and identification of the active ingredient. Such screening can be considered a part of the isolation procedure.

Once a lure is found, the performance of chemicals having related structures is investigated. Here the ingenuity of the chemist comes into play, especially in conjuring up compounds to be synthesized and in devising methods to prepare these chemicals.

The best chemical in the screening procedure may not be the best one in the field, where the final evaluation of a lure must be made, preferably under actual conditions of use. Such conditions are not standardized; for example, the effects of temperature, altitude, humidity, and duration of effectiveness have to be considered. Yet the most effective chemical in the field need not be the chosen one. Feasibility or cost of commercial production can be a deciding factor.

Important New Lures

SOME of the best lures found in our studies are shown in table 1. The sex lure of the silkworm moth is also included for comparison with the new gypsy moth synthetic lures (*14*). No general rules in regard to structural types that would be attractive are apparent at our present stage of knowledge.

Resistance to Specific-Type Lures

IF a specific lure-toxicant combination is used for control purposes, only insects drawn to the lure are exposed to the insecticide. The use of a lure in this manner should not be considered a permanent tool, as the insect's genetic potential may permit a strain that is unresponsive to the lure to be selected out for propagation.

If a specific lure is used for survey purposes and control measures are applied separately, the lure does not engage in the wholesale selection of survivors, and one would not expect to develop a strain of insects unresponsive to the lure. This mode of use can be expected to be permanent.

For survey or direct control, the use of an attractant upon which an insect depends for propagation (such as the natural moth sex lures) may be expected to be a permanent tool, since an unresponsiveness to the lure, if developed, will impair an insect's ability to find a mate and thereby decrease its reproductive potential. One interesting prospect for control, without the use of toxicant, is the spraying of the natural sex attractant over a wide area in order to confuse males in their attempts to locate females of their species.★★

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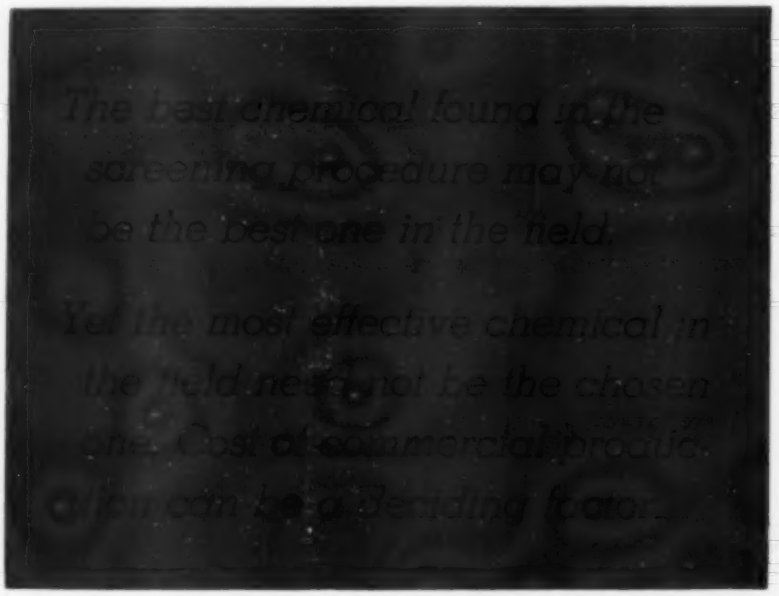


The Distribution Of Pesticides From The Maker To The User

Distribution of pesticide chemicals is quite unique and different from the distribution and sales methods which apply to industrial chemicals. Unfortunately, this is a fact which is not always appreciated by the company looking to enter the pesticide field.

Financing, government regulations, — the whole marketing approach differs considerably, and general line salesmen cannot normally be counted on to sell pesticides effectively.

DISTRIBUTION may be appropriately described as the total of all steps involved in the delivery of goods from producer to consumer. This includes sales methods, transportation, storage, financing, credit and accounting. A variety of methods and means have been employed to get pesticide chemicals from the manufacturer's plant to the eventual consumer. The following list is reasonably complete:

1. Manufacturers Direct
2. Distributors to Dealers
3. Area or Regional Distributors to Distributors to Dealers
4. Manufacturers' Agents
5. National Distributors
6. Co-Manufacturers
7. Formulator-Distributors

The distribution of pesticidal chemicals is quite unique and distinctly different from the distribution and sales methods which apply to industrial chemicals. Unfortunately this is a fact which is not always appreciated by the company looking to get into the pesticide field, with a sincere desire to integrate and diversify its product list by the addition of a line of pesticides. New concerns coming into the field, not realizing this fact, and attempting to follow the natural inclination to "fit pesticide chemicals into their normal or habitual distribution system" may well be dedicating their sales forces to failure and doing an injustice to their products, their competitors, and eventually their stockholders. Pesticides and the pesticide industry are thus sometimes placed in an unfavorable light.

That financial education is sorely needed in pesticide distribution, is not likely to be challenged by anyone in the pesticide industry. Term payments and consignments must bear a higher price tag — cash payments normally require a discount. Credit is expensive, and someone must inevitably pay for it.

This report is taken from a talk presented at the 42nd national meeting of the American Institute of Chemical Engineers, Feb. 21 to 24, by L. J. Polite Jr., Dixon Chemical and Research, Inc., Bloomfield, N. J.

Let's proceed with a theoretical new product, call it "Compound D." The new product has just graduated from the laboratory, having gone through the lengthy and expensive phases of product research, checking the multitudinous government regulations, screening and testing, residue determination, biological research, label preparation and registration, pilot planting, engineering design, etc. Market research has established that there are consumers for Compound D, and that it will merit the price at which it must be sold. Feeling that Compound D has "made the grade," you say, "Here it is, Marketing Department."

Most important at this stage is a fundamental marketing analysis prior to commercialization. It is at just this early stage that marketing so often fails. What is the potential for the product? What is its market acceptance? Acceptance of course depends on how it has performed in field testing, and what government approvals and experiment station recommendations it has elicited. Next, the consumer must become aware of the product. If it's a world beater, the difficulties are fewer, but if it is not then the promotion and advertising people will really be put to the test. At this stage we must come up with some fairly definite ideas as to what our anticipated rate of growth is in the overall market, and the necessary allocation of reserve capital for market expansion and continued product development. We recognize that our growth will depend, not on how many experiences we devour, but on how many we digest.

Quality of product is taken for granted, but product adaptability to local conditions also is a "must." We may well spray Compound D in the Carolinas, but want to dust it in Texas. And this is not always determined by climatic conditions or natural resources. In the pesticide field the customs and habits

(*Continued on Page* 86)

Agrico: *another of the major fertilizer firms owning Michigan fleets*

Michigans rated high in output, maneuverability, low maintenance

Use of one of the world's largest fleets of Tractor Shovels has helped The American Agricultural Chemical Company of New York City achieve important savings.

Typical of their Michigan-equipped plants is the one shown—at Humboldt, Iowa.

Here, of the nine sizes of Michigans available, Agrico owns 1¼ yd Model 75's and 2¼ yd Model 125's. Four of them. The first three were purchased from Michigan distributor, Hawkeye Machinery Co., Des Moines, in 1955 . . . Michigan speed, maneuverability, and the machines' fully-sealed all-Clark power trains considered major cost-reducing benefits over existing equipment. The success of these three machines led, as production demands increased, to purchase in 1956, of the fourth Michigan Tractor Shovel.

36,400 hours: virtually no downtime

When the above picture was taken, the four Michigans had compiled a total of 36,400 working hours. Outside of an engine overhaul on one machine at the 4200 hour mark, they had lost virtually no assigned work time. The Michigans are exceptionally rugged and dependable, says a company official. Another company spokesman, surveying records *from 37 Agrico plants*, adds, maintenance costs on Michigans are exceptionally low generally.

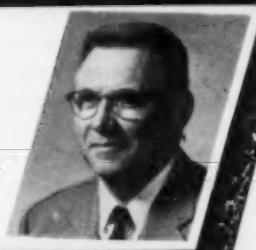
At Humboldt, the company's four Michigans handle all kinds of material. The 2¼ yd Model 125A is used for bulk shipment of finished super-phosphate. It carries an average of 3,650 lbs per load. Trips, stockpile to bulk shipment conveyor, about 500 ft one-way, take the Michigan about 2 minutes. This includes time to negotiate sharp corners and go across railroad tracks between buildings.

1¼ yd unit has capacity up to 75 tons hourly

In the same building, at the same time, Agrico uses one of their Model 75A Michigans for manufacturing. The 1¼ yd machine supplies all super-phosphate, potash, and other dry materials needed for plant production. Capacity of this Michigan Tractor Shovel on short hauls ranges up to about 75 tons per hour.

The two other 1¼ yd Michigans haul the finished fertilizer—18 grades in all—to bulk and bagged shipping conveyors. Even in peak days, these two rigs supply all of the finished materials for bagged and bulk shipping facilities.

High production capacity—plus dependability—plus speed and maneuverability—are three of the most important reasons for Agrico's repeat-buying of Michigans. Let us show you, in *your* plant, how these advantages can help you too.



Dale C. Kieffer

A talk presented at the annual meeting of NPFI, June 12. Mr. Kieffer is with Smith-Douglass Co., Norfolk, Va.

Process Losses In Fertilizer Plants

In old-type fertilizer plants, there were few places where plant food could be lost. In the modern plant the opportunities for loss are more serious. For one, plants are dealing with more concentrated materials—thus the loss of relatively small quantities represents more in terms of plant food. Second, the mixing unit has become a process in which nitrogen is fixed by chemical reaction—and the efficiency of the reactions has a lot to do with nitrogen losses.

NUMEROUS developments in the fertilizer industry since the end of World War II have brought about an increased emphasis on process efficiency and material recovering in fertilizer plants. Persons familiar with the history of the fertilizer industry will agree that manufacturing processes have changed more in the past 15 years than in the 30 years prior to the war.

It is true that during the prewar era there was a gradual upgrading in the plant food content of fertilizers made possible by the availability of more concentrated raw materials, but the basic manufacturing process underwent only minor change. At the outset of war, the manufacturing process centered around the conventional batch mixers—in which dry materials were blended with minor quantities of ammoniating solutions to produce the desired ratios. The use of liquids was still in its infancy. Limited amounts of aqua ammonia, ammonia-ammonium nitrate and ammonia-urea solutions were available. The use of liquids was limited largely by prevailing recommendations. In early practice the accepted rate was 24 lbs. of ammonia per 1,000 lbs. of super (2.4 lbs. per unit), with 30 lbs. as a maximum recommended only in cold weather (3 lbs. per unit).

The expansion in synthetic ammonia productive capacity to supply nitrogen to the ammunition plants during the war period was certain to accelerate changes in fertilizer production techniques. Beginning in 1946 there was a wide spread adaptation of mixing facilities to make the use of anhydrous ammonia possible. Production of ammonia-ammonium nitrate solutions doubled and quadrupled. In the fertilizer year 1958-59 the Commodity Stabilization Service of the USDA reports that 1,579,000 tons of nitrogen were available for fertilizer use in the form of liquids, including anhydrous ammonia. This represented 58% of all of the nitrogen available to the fertilizer industry that year. In 1941 nitrogen consumed in the form of liquids by the fertilizer industry amounted to only 75,000 tons, and this was but 17% of the total consumption.

There have been other changes (in the production of potash and superphosphates) that have exerted great influence on fertilizer manufacture. The rapid expansion of the potash industry in the U. S. during – and following – the War established muriate of potash as the primary source of K_2O in mixed fertilizers—and development of a triple superphosphate industry in Florida made concentrated phosphates an important source of P_2O_5 in the areas farthest removed from the phosphate mines. The magnitude of the increase in concentration of mixed fertilizer is illustrated by the following figures:

	1941	1957-58
Nitrogen	3.8	5.96
P_2O_5	9.6	12.53
K_2O	6.4	11.73
Total	19.8	30.22

Increased freight rates, higher handling costs, pressure from state officials and experiment stations, and competition pushed the average plant food content of mixed fertilizers gradually higher. Industry found itself faced with a serious problem of mechanical condition. The elimination of conditioners, the use of more concentrated salts, some of which were much more hygroscopic, and the increased chemical reactions after the fertilizer left the mixer created problems of bag-set. In a competitive industry some one is sure to do something about bettering troublesome mechanical condition. In the late forties a few companies turned again to granulation as an answer to the problem of mechanical condition, and that was the beginning of the problem of serious in-plant shrinkage.

Fertilizer granulation was not new in 1948. English manufacturers had been granulating fertilizers for some time, and the process had been tried in the U. S. on a small scale rather half-heartedly. But from that time until the present, granular fertilizers have practically taken over all the important con-

suming areas in the country with the exception of the Southeast.

Manufacturing units which prior to the advent of granulation consisted of an elevator, screen, mixer, and possibly a cooler, now include elevators, screens, ammoniators, granulators, dryers, coolers and 2 or 3 stacks. In the old plants there were few places where plant food could be lost—in the modern plant there are several. By loss, we mean the difference between the plant food bought and received and the quantity of N-P_2O_5-K_2O sold in fertilizers.

In the first place, the plants are dealing with more concentrated materials, therefore, the loss of relatively small quantities represents more in terms of plant food. In the second place, the mixing unit has become a process in which nitrogen is fixed by chemical reaction—and the efficiency of the reactions have a great deal to do with the nitrogen losses, and the loss in available P_2O_5. There is a constantly expanding use of liquids in the ammoniators and granulators, with phosphates being fed as acid—sulfuric acid used to produce $(NH_4)_2SO_4$ and to aid in granulation. All of the acids are generally neutralized with ammonia as anhydrous or ammoniacal solutions. We now produce in the mixer ammonium phosphate, ammonium sulphate, ammonium chloride and potassium nitrate, together with numerous side reactions.

Because of the heat, steam and gases generated in the ammoniator-granulators, they must be vented, and from these vents unreacted ammonia and volatized compounds can be lost. This loss will vary from plant to plant, depending on the ammoniation practices, design of the equipment, efficiency of scrubbers, etc.

Most modern granulating plants today include a dryer, and the granules from the ammoniator-granulators are fed directly to a dryer that is either counter-current or co-current – depending on the opinion of the designer. Volatilized nitrogen compounds can be lost due to over-heating. Dust losses contain all three of the plant foods.

Studies of in-plant shrinkage indicate that plants producing granular fertilizers lose from 4% to 6% of the nitrogen; 2 to 4% of the phosphate, and 2 to 3½% of the potash in-put; whereas plants producing non-graular fertilizers lose from 1½ to 3% of their nitrogen; 2 to 3% of phosphate and 2 to 3% of the potash in-put.

Dust from a fertilizer dryer is extremely difficult to collect and control. The nature of the reactions in the ammoniator-granulator are such as to produce very fine particles which adhere to produce the granules, but which tend to rub off due to attrition. And, of course, unfortunately the granulating process is not 100% efficient, so that about 30 or 40% of the dryer feed consists of oversize and ungranulated fines. The oversize is crushed and the fines are separated at the screens, and the crushed oversize and fines returned as recycle. Thus the dryer has another opportunity to over-heat and blow some of it out the stack.

Most plants are equipped with coolers and, generally, the coolers are very similar to the dryer—but without heat. The losses here are largely as dust. Coolers were in existence on many of the mixing plants before the advent of granulation, so the cooler hardly represents an additional source of loss.

All fertilizers are formulated with some pre-determined moisture content. It is common knowledge that moisture is a critical factor in the storage qualities of both granular and non-granular fertilizers. In the granular plants, however, it is not uncommon to over-dry the product by as much as 1%, thereby producing an overall material loss of this magnitude. Moisture is calculated as an ingredient in the finished product and, if it isn't there, the plant will fall short of anticipated shipments.

There is no question but that the use of liquids—and especially anhydrous ammonia—introduces a greater opportunity for nitrogen loss than would normally be expected with solid materials such as sulphate of ammonia, ammonium nitrate, urea, etc. Anhydrous ammonia, of course, is the cheapest form of nitrogen available to the industry, therefore, more loss can be tolerated.

There are always some handling losses between the bulk piles and shipping mills. In the last 15 years the front-end loader has become a standard piece of equipment in nearly all fertilizer plants. While it offers possibly one of the most economical methods for transporting bulk materials, it has not contributed anything to good housekeeping. The problem of spillage in the working areas has multiplied several times since the Georgia buggy has been replaced with mechanical equipment. While this spillage is wasteful in the sense that it requires cleanup labor and reprocessing, it does not represent an important material loss because most of the spillage finds its way back to the sweeps pile.

The loss at the shipping mills centers largely around over-weights on the bags. Within the past several years good automatic bag weighing devices have been developed for the fertilizer industry. Several of these machines are remarkably efficient and accurate if given reasonably good maintenance and care. Nevertheless, the best mechanical equipment that has been developed can only be expected to be consistently accurate within a reasonable

tolerance. I am told that some of the larger companies have conducted statistical studies of variation in bag weights and have concluded, as a result of these mathematical investigations, that it is necessary to deliberately over-weigh all bags in order to be sure that all weights will be within an acceptable tolerance of the stenciled net weight.

In nearly all of the states in which substantial quantities of fertilizers are used, provision has been made for State Control Laboratories. The State Control officials periodically publish the results of their determinations. The fertilizer industry is highly competitive, and most companies are sensitive to excessive penalty reports. Nearly every manufacturing department makes a sincere effort to produce fertilizers that will never analyze below a reasonable tolerance of the guarantee.

It must be recognized that the sampling methods employed by the industry, and by the various States cannot, in the nature of things, be perfect. The analytical procedures, while good, are still subject to some variation. Since there are "unknowns" that must be taken into account, fertilizers are often deliberately over-formulated in order to insure against unfavorable official determinations. This represents an intentional plant food loss.

Since the problem of what appeared to be heavy plant food losses has been perplexing to the company management for the past few years, it was suggested that a study be sponsored by NPFI to develop some useful industry-wide information on shrinkage. A committee consisting of representatives from several manufacturing departments was appointed, with Vincent Sauchelli functioning as chairman.

About a year ago this committee developed a questionnaire which was subsequently sent to all member companies as a preliminary step in the investigation of in-plant shrinkages. It was agreed that for the purpose of the questionnaire shrinkage in fertilizer plants should be broken down into *Intentional* and *Unintentional* losses.

The *Intentional* losses were divided into (4) categories:

(1) Formulated free ammonia nitrogen loss while mixing.
(2) Plant food overage formulated as safeguard against deficiencies.
(3) Weight overage at the time of packaging as a safeguard against short weights.
(4) Other intentional losses.

The *Unintentional* losses were divided into (6) categories:

(1) Nitrogen loss as ammonia and fumes while mixing.
(2) Dust losses while mixing.
(3) Leakage in liquid lines.
(4) Over-weight at the time of packaging.
(5) Moisture losses unaccounted for in formulation.
(6) Other.

Several companies co-operated in the study. The reports were summarized by Mr. Sauchelli—and later reviewed by the committee.

The TVA type continuous ammoniator is used extensively in granulating plants, however, it apparently has not been incorporated in many production units turning out only pulverized fertilizer. In granular plants it is used both as an ammoniator and a granulator. Since nitrogen losses are greatest in plants producing granular fertilizers, it could be reasoned that the old batch mixers are still the most efficient. This is hardly a fair assumption, because more liquids, particularly anhydrous ammonia, are introduced along with acids in the granular plants to produce heat, and aid in granulation. The conditions most favorable to granulation are not always ideal for best ammonia absorption. In general, this possibility is the most important reason for the difference of about 2.5% more nitrogen loss in the granular plants as compared with batch mixing operations.

Under similar conditions the TVA type ammoniator undoubtedly would compare favorably—and possibly show a slightly higher efficiency—than the batch mixer.

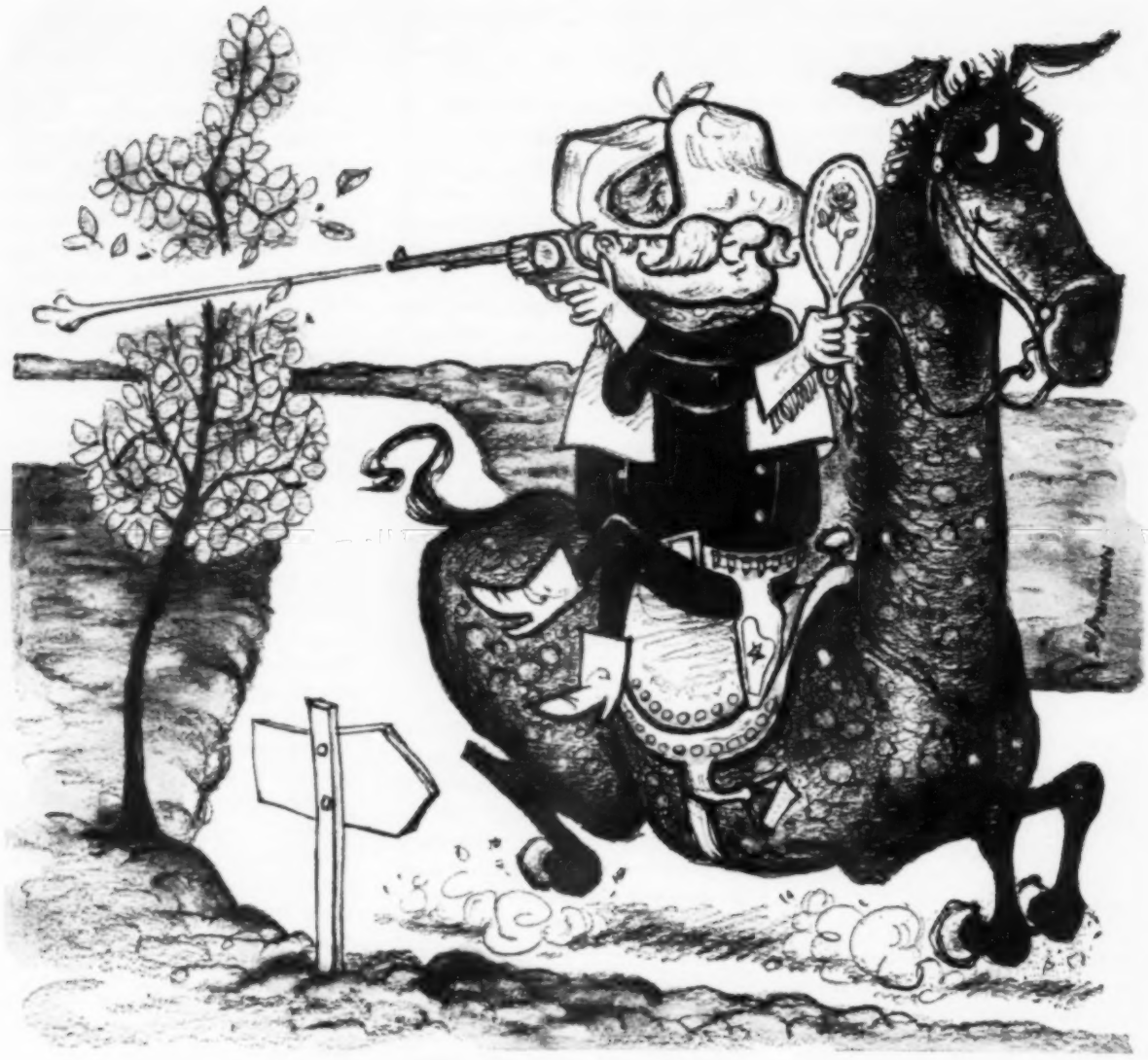
Apparently, the operators of granulation units anticipate higher nitrogen losses, because most companies reported allowances in their formulas which, on the average, amounted to about 3.4% of the total nitrogen guarantee as an anticipated loss. This leaves only 1.5% nitrogen loss that is Unintentional and, to a large measure, unexplained.

Based on the reports of companies co-operating in the in-plant shrinkage survey, it would seem that dust losses contribute only a minor part to the overall material loss in granular plants as compared with non-granular operations. The basis for this conclusion is found in the figures pertaining to phosphates and potash. Both of these plant foods must be lost from the dryers and ammoniators as dust. In non-granular plants the overall loss in phosphate was 2.74%, and potash was 2.15%. In the granular plants phosphate losses amounted to 2.85%, and potash losses 2.54%. From this, it is quite apparent that the major problem in the granular plant centers around nitrogen losses—largely as ammonia, smoke and fumes.

I have been quoting averages, but it should be emphasized that there is a great deal of variation between plants and companies, particularly with respect to nitrogen recovery. Some of these differences may be due to variations in overall efficiency of operation, but probably more of it is due to differences in formulating policies, i.e. the use of higher percentages of anhydrous ammonia versus solutions and solids—and higher ammoniation rates on the phosphatic materials.

It must be expected that the phosphate losses will exceed the potash losses to some extent, because, in addition to handling and dust loss on phosphates, there is the additional possibility of conversion of available P_2O_5 to citrate-

(*Continued on Page* 84)



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PLANNING SALES ACTIVITY

Good planning and follow through are recognized keys to successful business operations and could be the difference between black ink or red on the ledger. An activities chart on the wall helps by encouraging planning and by reminding fertilizer men of those plans when the pace gets hectic.

International Minerals & Chemical Corp., as a small part of its Customer Service program, offers sample "activities charts" to department heads as a guide to long range planning which "gives ideas time to incubate before they hatch." Long range planning prevents the necessity of making sudden decisions.

A "CONSCIENCE on the wall" may help every fertilizer man who has penciled—and lost—a note to himself to "plan sales meeting" or "get up ads."

The "conscience" is a chart of activities—a picture of work to be done in the coming year—that is being used successfully by many fertilizer manufacturers across the country.

There's nothing particularly startling or new about the idea, these manufacturers concede. It's just that having a plan chart put up in plain view acts as a helpful spur to the best-intentioned planner.

And at the Indiana Farm Bureau Cooperative Association, top management says that it goes beyond serving as a reminder of what's to be done and when.

"It helps to coordinate everybody's work," says Arthur Mullin, manager of IFBCA's fertilizer department. "It encourages a planning and timing of projects that build to a sales goal."

"We've always had a program, but now it is put on paper and organized. With the help of the chart we had the best plan and program this year we've ever had."

Donald Fiery, sales manager of Miller Chemical Corporation, Charles Town, West Virginia, says his chart, "is a check on myself. When you start getting busy, things slip away from you. When it's on the wall at least you know what you're supposed to be doing."

"The activities chart serves as a reminder, jogs our memories," agrees James Woodall, fertilizer manager of the Mississippi Federated Cooperative.

"It helps to have all our activities together on a chart so we can see what needs attention now," says William Campbell of the Dixie Guano Co., Laurinburg, North Carolina. "When you sit down and project your plans for the future, you come nearer to getting them done on time."

"A chart makes a little more organization in sales planning," comments Frank Seymour of Weils Fertilizer Works, Goldsboro, North Carolina.

Fertilizer sales efforts are coordinated with the help of a wall chart at the Indiana Farm Bureau Cooperative Association. Meeting with fertilizer department manager Arthur Mullin (right) are: (from left) Eugene Holcombe, Melvin Leach, and Ivan Moore, managers respectively of the advertising, production, and sales departments of the Indiana Farm Bureau Co-op.

Several manufacturers warned against regarding a schedule as inflexible. An unexpectedly late spring, such as farmers generally had this year, means adapting the plan to fit the circumstances.

The manufacturers also pointed out that a new planning program should be set up each year; this year's schedule may not fit next year's program because the fertilizer business is changing and dynamic.

These charts are adaptations of a plan offered by International Minerals & Chemical Corporation, and are just a small part of their Customer Service program.

The way the Indiana Farm Bureau Cooperative Association uses the chart is probably typical.

Last fall Mr. Mullin, who has been with the cooperative since 1933, sat down with the managers of the advertising, production and field (sales) services department to map out spring fertilizer campaign.

"First we blocked out the sales season on the chart," Mr. Mullin explains. "This runs from mid-November to June, with sales peak — in April and May."

Then the four men studied the market research report on expected spring fertilizer sales. In the light of their first-hand knowledge of Indiana farm conditions, they adjusted the figures.

Upon this foundation the men built plans for their departmental activities, and put them on the chart.

Field sales meetings were scheduled for late February and early March by Ivan Moore, a 25-year IFBCA veteran in charge of field service. On the chart was a reminder two weeks before the meeting to think through objectives and then prepare the meeting in detail the next week.

Since field men handle the meetings with managers of the 85 retail county cooperatives, Mr. Moore planned objectives for these sessions at the same time.

Meanwhile, the advertising manager scheduled October for allocating budget, selecting media, and laying out ad schedules to support sales activities.

A personal copy of the sales activities chart helps IFBCA Production Manager Melvin Leach keep his work geared to plans of others.

Another three weeks were slated for preparation of material for newspapers, magazines, radio, television, and direct mail advertising.

Production manager, Melvin Leach, started planning purchasing, warehousing and manufacturing to gear his activities to mesh with the sales and advertising efforts.

"This long-range planning prevents the necessity of making sudden decisions," Mr. Leach comments.

"With enough lead time, you don't get into crash programs—working to get things half-done when time pushes you," Mr. Moore says. "Planning gives ideas time to incubate before they hatch."

Advertising manager Eugene Holcombe points out that if advertising, for instance, didn't plan ahead, it might discover in March the need for a spring fertilizing picture and be unable to get it. That picture should have been taken the previous spring.

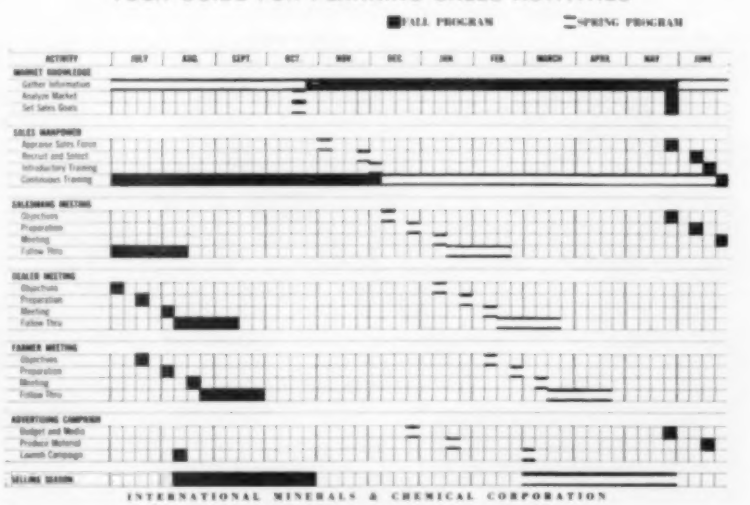
But the IFBCA is planning well in advance. For instance, in May, the market research survey for fall fertilizer sales was being readied. Fall fertilizer sales activities have already been scheduled on the chart.

The fertilizer sales and promotion program must also fit in with the other programs of the cooperative, which is Indiana's largest agricultural business, selling more than $66 million in supplies annually to its 130,000 patron families. In addition, the IFBCA markets more than $90 million worth of farm products for its members.

Good planning and follow through are recognized keys to successful business operations and could be the difference between black ink or red on the ledger.

An activities chart on the wall isn't a *cure-all*. But it does help by encouraging planning and by reminding fertilizer men of those plans when things get hectic.★★

A Sample Planning Guide



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Fertilizer Views and News

Dr. Vincent Sauchelli

Dr. Sauchelli is Chemical Technologist for National Plant Food Institute.

When Is A Fertilizer Complex ?

LINGUISTIC innovations are no rarities in most fields of human activities. It is no surprise that they should occur in fertilizer literature. A comparatively recent newcomer to the jargon of fertilizer manufacturers is the word "complex" as applied to a type of mixed fertilizer. We have been accustomed to the use of such descriptive words as "mixed goods," "grades," "compound fertilizers," "complete fertilizers," "analyses," and "formulations" as practically synonymous. Each conveys a fairly definite concept of what is intended when used to communicate among fertilizer and agronomy workers. But, recently, we have been hearing and seeing in print the phrase "complex fertilizers" which originated in Europe. The question has been asked us, What is meant by "complex" fertilizers? Students who have to struggle through the maze of ambiguity in fertilizer jargon represented by the confusing use of P_2O_5, when phosphorus, phosphoric acid or phosphorus anhydride is meant, and vice versa; and K_2O, when potassium or potassium oxide is intended, find the complexity compounded with the use of the actual phrase, "complex fertilizers." The concept is quite distinctive, however, as we shall try to show.

Perhaps it may be best to start by describing what a compound fertilizer is. Plants require for their growth and nourishment at least 16 chemical elements. The fertilizer industry is based on the discovery that plants depend for their development upon mineral nutrients, among which phosphorus, nitrogen, potassium, calcium, magnesium and sulfur are utilized in major quantities. For almost a century these six elements have formed the basis of the industry's manufacture of plant foods, and particularly, the first three have been supplied either as binary or as ternary combinations. Generally speaking, when a product is denominated "a fertilizer" it is understood that it will furnish at least two of these three major constituents, that is, nitrogen, phosphorus or phosphorus anhydride and potassium or potassium oxide. This understanding is, in fact, written in the fertilizer laws of many countries. The chemist naturally referred to such combinations as "compounds", since such a word is commonly used in his profession to describe mixtures of chemical substances, or the product resulting from the chemical reactions of a mixture of several substances. The industry accepted the phrase and used it to describe its manufactured product. A material that supplies only nutrients is called merely a "fertilizer material" or "a simple." In recent years, chemical control chemists have been at odds in reaching an understanding as to whether certain chemical materials which supply two nutrients are to be considered "fertilizer materials" or "fertilizer compounds" as defined by statutes. Up till now unanimity has not been achieved.

When a fertilizer is prepared by carefully mixing a number of materials according to a formula or specification, it is a compound fertilizer; but, when a binary or ternary fertilizer results from chemical reaction of the mixture it is a "complex fertilizer." It is the difference between a physical mixture and a truly chemical compound. For example, the nitrophosphatic fertilizers resulting from the interaction of nitric acid and phosphate rock or nitric and phosphoric acids reacting with phosphate rock are complex fertilizers.

The European concept of complex fertilizers is concerned more particularly with the process, rather than the nature of the final product. The majority of fertilizer personnel both at home and abroad continue to denominate fertilizers as compounds or mixed goods. Another distinction, although minor, is that complex fertilizers are granulated, whereas compound fertilizers may be either granulated or of the non-granulated conventional kind.

From an agronomic viewpoint it must be noted that complex fertilizers resulting from nitric acid treatment of phosphate rock have a percentage of dicalcium phosphate higher than is characteristic of acidulation with sulfuric acid. The dicalcium phosphate is considered in many countries to be less quickly soluble than monocalcium phosphate, the predominant type in superphosphates. Experiments in Europe have shown that

(Continued on Page 86)

Arcadian® News

Volume 5 | For Manufacturers of Mixed Fertilizers | Number 7

Technical Tips to Help You Save Money

Efficient Ammoniation Puts More N in N-P-K

Production of high-analysis, high-nitrogen mixed fertilizer becomes most economical when all the superphosphate in the mix is ammoniated at the highest practical rate of ammoniation. With ARCADIAN® Nitrogen Solutions, most standard production procedures can easily be adapted to use about 6 pounds of ammonia per unit of finely divided 20% superphosphate, and from 3 to 3.5 pounds of ammonia for triple superphosphate. Keep in mind that one pound of ammonia will neutralize 3.71 pounds of 60°Be (77.67%) or 3.09 pounds of 66°Be (93.19%) sulfuric acid. Of course the very best production performances that yield absolutely maximum benefits may slightly exceed the above ammonia to superphosphate ratios.

Sulfuric Acid gives Higher Heat

In producing pulverized, semi-granulated and granulated fertilizer, it is often desirable to obtain higher temperatures in the mixer than would normally result from getting maximum ammoniation of superphosphate. The usual way to obtain this higher heat is through introduction of sulfuric acid. Indeed, the very high affinity of ammonia for acids assures this heat build-up before much of the ammonia has had a chance to react with the superphosphate. For example, a pound of ammonia reacted with sulfuric acid will generate about 2940 BTU's of heat in contrast to 1540 BTU's from reaction with triple superphosphate alone, and only 1460 BTU's with 20% superphosphate.

But this Heat is Costly

However, too many operators are prone to build up mixer heat with sulfuric acid without regard to the higher cost involved. Before embarking on a long-range program with sulfuric acid it would be wise to explore all other possibilities for getting the same result, such as better performance in the dryer. This alternative becomes even more attractive when you consider that heat produced by the chemical action of sulfuric acid *may cost 5 to 10 times as much* as dryer-produced heat by means of common fuels such as oil or gas.

Look to Your Procedures

Experience has shown that where equipment and techniques fail to perform in accordance with indicated levels, it is not usually the chemistry and mathematics that are at fault but something in the process itself.

For example, frequent cause of failure to derive the most economical results from ammoniating solutions is the formation of pellets, or large plastic masses, before all of the ammonia has been added to the mix. This reduces the surface area exposed to ammoniation, as well as enclosing some superhosphate, and conceivably acid, within the larger pellets —beyond reach of the ammonia. This leads to wasteful use of acid and loss of nitrogen—whether it occurs in granulated or pulverized fertilizer, in batch or continuous mixer.

Another cause of failure is the indiscriminate use of excess amounts of acid. This can result in loss of nitrogen even though the original intention was to retain a higher portion of the ammonia input.

Four Things to Watch

Number one is proper introduction of nitrogen solution to assure intimate contact between superphosphate particles and the ammonia. It has become axiomatic in the industry that best ammoniation results are impossible without this all-important contact. It has also been found that operators cannot count on reclaiming much of the ammonia if it has not made proper initial contact with the superphosphate.

The second thing to watch in your procedure is your introduction of sulfuric and phosphoric acids. Too many producers are not fully aware of the importance of distributing these acids thoroughly throughout the mass at the time of ammoniation. The fact is, that if ammonia is applied in small areas of the mix at excess rates, some ammonia is bound to escape, particularly at the

(continued on following page)

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higher rates of ammoniation where volatilization occurs quite rapidly.

Thirdly, keep an eye on overloads in continuous ammoniating systems. Overloading in tons per hour per foot of ammoniating distributor pipe is quite common with continuous ammoniating systems. Serious enough in itself, the problem assumes even greater proportions when recycle is taken into account. In view of this, any remedial suggestion that may shorten the effective ammoniating region will naturally be resisted by the experienced operator. However, where this overloading is causing premature granulation which seriously affects the product, it is well worth trying to apply the acid in the continuous mixer a little ahead of the final portion of ammonia. Another approach to solving overload problems is to increase recycle wherever it is not already excessive. Or the use of 66°Be sulfuric acid may be advisable. Again, reduction of hold-up time in the mixer during ammoniation can also be tried, where practical.

The fourth item to watch is the operation of distributor pipes. If improperly designed, or if some parts are badly worn or corroded, excessively large volumes of solution, acid, water or steam may be introduced into small areas of the mix. This always means trouble.

Batch Mix Remedies Simpler

While the principles of good ammoniation remain the same with rotary batch mixers, avoiding and correcting problems is much simpler. It is relatively easy to design distributor pipes for the job at hand. And it's equally simple to make daily pipe inspections. In addition, the timing of introduction of acid (when used) and ammoniating solution can be regulated to a fine point—ranging from simultaneous to any desired delay interval.

Where the formation of undesired pellets becomes a problem in rotary batch mixers, keeping the flights clean to assure rapid discharge invariably helps. Avoid any dripping of liquids after valves have been closed. Be sure that all acid is in the mass and well distributed before all of the ammonia is applied.

If you need information specific to an ammoniation problem in your plant, Nitrogen Division technical men will be only too happy to help. Contact: Technical Service, Nitrogen Division, Allied Chemical Corporation. 40 Rector Street, New York 6, N. Y.

Tissue tests show the farmer he needs more and better fertilizer.

Using Tissue Tests to Sell Fertilizer

Crops must have an adequate supply of needed nutrients *within the plant* to make vigorous growth and produce high yields. The best way to prove that yields are limited by plant food hunger is to test the nutrient content of the plants. This can be done efficiently and economically by on-the-spot tissue tests.

When you show a farmer, by tissue tests in his field, that his plants are deficient in certain nutrients, you present an excellent case for the use of more and better fertilizer. Tissue testing *now* can help you sell a bigger tonnage of better fertilizers for future crops—fertilizers that are more profitable to you and to farmers.

Tests Reveal Facts

Tissue tests graphically portray the fertilizer needs of crops. In a Missouri survey, tissue tests in 125 corn fields showed that 58% of the fields were deficient in nitrogen, 30% were deficient in phosphorus, and 26% were deficient in potash.

Tissue tests reveal the true reason for low yields. Last spring, some North Carolina farmers complained about the poor performance of nitrogen on small grains. Tests showed that this was due to a lack of potassium and magnesium. The farmers were depending on carry-over from previous row crop fertilization to supply phosphorus and potash requirements. In only one instance out of 20 to 30 cases had a complete fertilizer been applied to the grain at planting time.

Summer Selling

Many fertilizer salesmen have discovered the fact that tissue tests are real salesmakers! The first day one salesman used a tissue test kit, he sold an additional 30 tons of nitrogen. His tests proved that a 2-1-1 ratio would have been a better ratio to use in the corn field he visited.

Tissue testing is a profit-producing job for your salesmen during the slack season in July and August. This is the right time to test most crops for plant food deficiencies. On-the-spot tests made now in farmers' fields will show them the plant food needs of their crops. Tests are scientific and believable. The right

fertilizer for the crop ceases to be a matter of personal opinion. The farmer can see what is needed by the results of the test. When he sees what is needed, he is ripe and ready to place an order and he is grateful to your salesman for making the test.

Where to get Test Kits

It will pay you to equip your salesmen with tissue test kits and get them out into the field making tests and making sales. Of course they should learn how to make tests before they start. They can study directions and try it a few times...and get the advice of an agronomist. Tissue test kits can be obtained from: Tissue and Soil Test Kits, Department of Agronomy, Purdue University, Lafayette, Ind.; or Denham Laboratory, Denham Springs, La.; or Urbana Laboratories, Urbana, Ill.

Write Nitrogen Division

If irrigation is used in your area, tissue tests are a valuable aid in selling fertilizer for use in irrigation water. Write to Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N. Y., and ask for as many copies as you need of "How to Apply Fertilizer in Irrigation Water." These will be sent to you without charge or obligation. You can also ask any Nitrogen Division agronomist for some pointers on the use of tissue tests on both irrigated and non-irrigated crops.

It Pays to Sell More N in N-P-K

Practically all our large-acreage crops except legumes need more nitrogen than any other plant food. That is the economic reason why use of nitrogen has increased faster in the last 15 years than use of phosphorus, potash or other plant foods.

You can sell more nitrogen, and get more for it, by pushing high-nitrogen mixed fertilizers such as 15-10-10, 16-8-8, 14-7-7 and 12-6-6. You'll get the entire sale in one deal when you supply all the major plant food needs of the crop in one package. And in the long run too, you'll gain good will because you are providing what farmers really need—balance in plant food application.

Saves Farm Work

When farmers apply fertilizer that provides N, P and K in the right balance for their crop, they can't forget to do the job right. Every year, somewhere, an important acreage of farm crops does not get the nitrogen side-dressing or top-dressing needed to make the crops do their best. Bad weather and the rush of other work prevent getting the job done. Sell high-nitrogen mixed fertilizers and you protect farmers from this constant problem, and put more profit in your own pocket.

N for Cash Crops

Corn, wheat, cotton, sugar beets, most vegetables and fruits—by far the majority of cash crops—need more nitrogen than other plant food. Now that high-nitrogen mixed fertilizers are so concentrated, farmers can apply all the fertilizer needed for high yields in one or two applications, pre-plant or in the planter. The new-style planters that place the fertilizer to one side and deeper than the seed make it easy to use large amounts of fertilizer in the row without seed damage.

Feed Crops Too

About 80 percent of all our harvested crop acreage goes into livestock feeds. These fields, along with millions of acres of unplowed range and pasture, make livestock feed the biggest crop market by far.

Most hay silage and grazing crops need high-nitrogen mixed fertilizer in 2-1-1 or even 3-1-1 ratio to produce the largest amounts of high-quality feed, containing the most protein and other digestible nutrients. You do livestock farmers a favor by selling high-nitrogen balanced fertilizer for top-dressing.

Better Feed Value

Grain crops, too, are largely used for feed. Results on many farms show that corn, wheat, barley, oats and milo all need more nitrogen than any other plant food to produce big yields. The high-nitrogen fertilizer also increases the protein content of many grains, and thus increases the feed value of the crop two ways.

Many crops still don't get enough fertilizer of any kind. It is easier to show skeptical farmers the profits fertilizer can make for them if you sell them fertilizers balanced to the needs of their crops. When you sell more N in N-P-K you put more profits in the bag for the farmer...and for yourself.

Pre-reactor Process Popular in Midwest

The new pre-reactor process for producing high-analysis, high-nitrogen mixed fertilizers is rapidly gaining in popularity among manufacturers in the Midwest. They are using this process to meet the growing demand for high-nitrogen fertilizers for corn and other crops.

The use of 2-1-1 and 3-2-2 ratios is increasing. Probably the biggest gain this year will be in consumption of 16-8-8 and 15-10-10. Not many years ago, it was difficult to produce 2-1-1 and 3-2-2 ratios. But, new developments in methods and materials have made high-analysis ratios easy to manufacture.

This is the first full season that some Midwest manufacturers have used the pre-reactor process. Results have been phenomenal. Manufacturers are now able to produce high-analysis, high-nitrogen fertilizers with the same ease and confidence with which they made low-nitrogen fertilizers in the past.

Ask Nitrogen Division

The pre-reactor process enables you to produce high-nitrogen fertilizers with *all* the nitrogen derived at low cost from ARCADIAN® Nitrogen Solutions. It also offers many other outstanding advantages. The cost of adding a pre-reactor system to a complete granulating plant is surprisingly low. It will pay you to get all the facts. Contact Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N. Y.

HERE'S THE BIG LINE OF Arcadian® NITROGEN SOLUTIONS

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	-108

Other ARCADIAN® Products: URAN® and FERAN® Solutions • Ammonia Liquor • N-dure® A-N-L® • Ammonium Nitrate • UREA 45 • Nitrate of Soda • Sulphate of Ammonia

NITROGEN DIVISION

Allied Chemical

MAIN OFFICE: 40 RECTOR ST., NEW YORK 6, N. Y., PHONE HANOVER 2-7300

Hopewell, Va., P. O. Drawer 131	Glenview 8-6301	Columbia 1, S. C., 1203 Gervais St.	Alpine 3-6676	Indianapolis 20, Ind., 6060 College Ave.	Clifford 5-5445
Ironton, Ohio, P. O. Box 98	Drexel 7-4366	Atlanta 3, Ga., 127 Peachtree St., N. E.	Jackson 2-7805	Kalamazoo, Mich., P. O. Box 869	Kalamazoo 5-8676
Omaha 7, Neb., P. O. Box 166	Bellevue 1464	Memphis 9, Tenn., 1929-B South 3rd St.	Whitehall 8-2692	St. Paul 14, Minn., 764 Vandalia St.	Midway 5-9141
Raleigh, N. C., 606 Capital Club Bldg.	Temple 3-2801	Columbia, Mo., 1134 Highway 40W	Gibson 2-4040	San Francisco 4, Cal., 235 Montgomery St.	Yukon 2-6840

The AGRICULTURAL Applicator

- "No Drift" Spray Demonstration
- Aerial Application Costs
- Effective Defoliation
- Atomizing Spraygear

A new type of nozzle and spray system was demonstrated recently at San Antonio, Texas. The spray produced by the system has a mayonnaise-like consistency. The key to the system is a specially designed nozzle. Story on page 57.

"Low Drift" Application Is Demonstrated

A specially designed nozzle produces an invert emulsion of water-in-oil herbicide that drifts only 40 feet in a 20 mph wind when released from a helicopter 30 feet above the ground. The system is expected to work with pesticides as well.

The mayonnaise-like consistency of the spray is clearly shown in this photo taken during the demonstration.

A NEW type nozzle and spray system, which produces a spray with a mayonnaise-like consistency was demonstrated recently at San Antonio, Texas, by Stull Chemical Co. A herbicide spray, applied by helicopter in a 20 mile-per-hour wind, drifted only 40 feet, although the helicopter flew 30 feet above the ground. Had it flown at the usual 10-foot altitude, drift would have been much less.

The key to the success of the "low drift" herbicide is a specially designed nozzle which produces an invert emulsion of water-in-oil herbicide. The nozzle and the spray system are the inventions of Dr. Judd Morrow, director of the Southwest Agricultural Institute of San Antonio. Stull Chemical, also of San Antonio, sponsored the project and has applied for patents on both the nozzle and herbicidal mixture.

Details of spray composition and nozzle design have not been disclosed, but the emulsion is a mixture of water, a nonaromatic oil, and herbicide. Additives include a surface active agent, an emulsifier, and a sticking agent, such as a monoglyceride. Active ingredient content per pound is about the same as that of conventional sprays, according to Dr. Morrow.

The helicopter used in the demonstration carries two tanks; one holds water, and the other holds oil and chemicals. Each has a feed line to the nozzle where the components are intimately mixed and the invert emulsion formed. The nozzle ejects the emulsion in uniform, 80 micron droplets. This is about double the size of droplets formed in the usual herbicidal sprays, but it adds to the drift resistance.

Dr. Morrow sees other advantages in his invert emulsion system besides its low drift characteristics. The spray is stable for weeks; because the oil is nonaromatic; it doesn't evaporate easily; and, he points out, the system will work for insecticides and other agricultural chemicals as well. In addition, it can be applied by airplanes, ground equipment, and hand sprayers, as well as helicopters.★

The Influence of Volume and Competition on Aerial Application Prices

The fact that aerial application has survived indicates that it is economically feasible. For operators to provide greater service and take home more profits, however, information pertaining to costs and the nature of the market is needed.

by Ted R. Nelson
Extension Economist
University of Nebraska

AGRICULTURAL aircraft have been in use in the midwest on a commercial scale for at least 15 years, but there presently are very little reliable data available concerning the economics of either the individual firm or the industry. The fact that aircraft have survived in a competition with ground application equipment indicates that this means of applying chemicals and fertilizers to field crops has been economically feasible. Information pertaining to costs and to the nature of the market for aerial application now is needed and desired by those involved.

The aerial applicator, as a rule, resembles the farmer and the small businessman in that he performs most, and in many cases all, of the functions required in the operation of the firm. He furnishes a major portion of the capital investment, operates equipment, makes the management decisions, and serves also as salesman and credit manager. He is capital, management, and labor; but it is the management aspect with which this article is concerned.

TABLE I
Typical Fixed and Variable Costs: Agricultural Spray Plane

	Firm 1	Firm 2
Original cost of a/c	$8,500.00	$6,500.00
Expected life	5 years	10 years
Salvage value	3,500.00	1,000.00
Cost of nurse truck & equip.	1,500.00	1,500.00
ANNUAL FIXED COSTS		
Depreciation, a/c & Nurse truck	995.00	640.00
Taxes	20.00	16.00
Interest on investment (avg. over life of the a/c)	360.00	190.00
Ground insurance (comprehensive)	160.00	160.00
Hanger Fees	180.00	180.00
Licensing	300.00	75.00
Equipment repairs	25.00	35.00
Airframe repairs	50.00	[1]
Cleaning materials for tanks	100.00	100.00
Nurse truck (repairs, insurance, taxes)	100.00	100.00
	$2,290.00	$1,496.00
VARIABLE COSTS (per acre)		
Pilot	.30	.25
Flagmen	[2]	.075
Gasoline	.06	.06
Oil	.006	.003
Repairs: Engine	.015	.017
Airframe	[1]	.004
	$.381	$.409

[1] Operator No. 1 regarded airframe repairs as an annual cost; No. 2 considered them to be a function of use rather than time.
[2] Farmer furnishes flagmen at no cost to applicator.

Nature of the Market

Aerial applicators, as an industry, are selling services in a dual market. There exists a near monopoly in the spraying of some crops and pastures which are not adapted to ground application because of soil conditions, topography, or time. The demand schedule for this market segment is not sensitive to the presence, or pricing policies, of ground equipment. As long as the farmer anticipates returns from the spraying, his only rational decision is to pay whatever price is asked.

The major share of spraying, however, is on field crops where ground equipment can be substituted for aerial application. Here the farmer not only makes the decision concerning whether or not to spray, but also may choose from among several alternative methods of application. The choice of method is based on: cost, availability of equipment, effectiveness, risk of physical damage to the crop, and labor.

The ability of the airplane to treat large areas in a short period of time makes it a strong competitor in this market. Much of the cost of operating aircraft is fixed, and varies little with the number

Presented at the 9th annual Nebraska Aerial Applicators Short Course, Norfolk, Nebr., Feb. 4 and 5, 1960.

of acres covered. Thus, a large acreage is required for profitable operation. Table I represents estimates of fixed and variable costs for two different applicating firms. These data are only estimates and are not represented as average costs for actual firms in the spraying business.

Table I indicates that there are significant differences in fixed costs between operators. The primary differences in the two cases cited are the estimates of useful life of the aircraft and the additional interest on investment required for the more expensive plane.

Figure I illustrates the cost curves for various levels of operation, assuming annual fixed costs of $2,000 and variable costs of forty cents per acre.

No attempt has been made in Figure I to draw a line at maximum acreage because of physical limitations. Such a point does exist for every firm in the industry on a per plane basis, however. This maximum acreage will vary depending on the crops and weeds being treated and climatic conditions. Covering 60 acres per hour, 250 hours of application time would reach the outer extremity of Figure I. At this point the economies of scale have largely been dissipated.

Operating at Point A (covering 3,000 acres at $1 per acre) would produce an average cost of $1.10 per acre, which results in a $300 operating loss. By moving Point B and charging the same rate, a net return of $1,000 could be realized. To make this shift, up to $1,299.99 could be expended for advertising or promotional activities, although a considerably smaller expenditure would accomplish the same end in many cases.

Point C illustrates a possible result of reducing the application charge to eighty cents per acre. At this volume, average cost is at sixty-three cents per acre, and a net return of $2,125 is indicated: [(.80-.63) x 12,500 acres.] A part of this increase certainly would be absorbed in additional advertising costs, overtime for employees, and collection costs on the additional business. The lower charge might, on the other hand, bring in the additional business without marginal advertising expenditures.

These effects would vary with localities and are not known with any degree of certainty. It is part of the managerial function to estimate these unknowns, set policies, and take appropriate action to maximize net returns to the business.

Farm Sprayer Costs

The cost of operating farm sprayers also is a dependent variable determined by amount of use. A farm sprayer costing $335 could be expected to cost the owner about $75 per year in fixed costs, plus about 40 cents per acre in variable costs, evenly divided between power and labor. If only 75 acres were covered per year, the average cost per acre could be expected to be about $1.40 per acre. Doubling the acreage would reduce the cost to just under 80 cents.

There are other considerations important to the farmer, however. He is in the business of producing grain and livestock and his labor and machinery may be needed in other phases of the farm business when timely spraying should be accomplished. His available labor often is tenfold as productive when a crop is ready for harvest, or in need of a critical cultivation, as the $1.25 per hour used above in estimating his labor cost of spraying. This also is the age of specialization and the farmer may wish to avoid handling dangerous insecticides. As a matter of fact he is not legally permitted to apply some of them. He will, however, always watch costs carefully since his livelihood depends on it.

Final Considerations

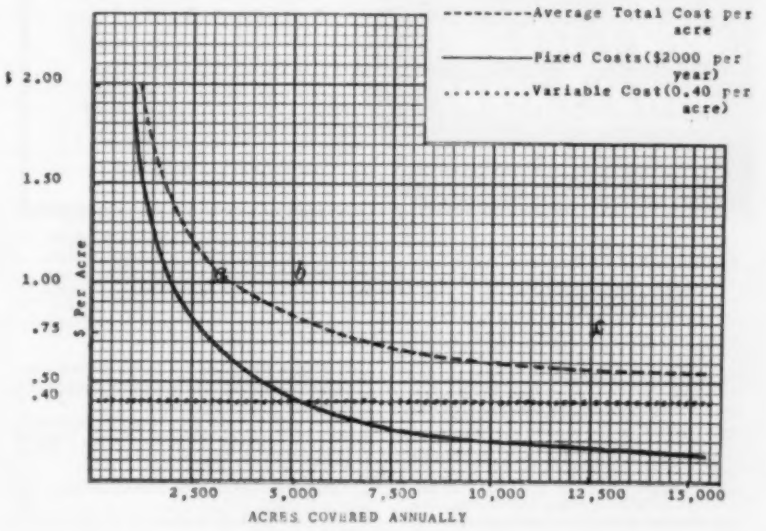
There are many other aspects of the topic that are worthy of consideration. One of them is a sliding scale of prices providing for lower rates for large acreages with long runs. Another is the giving of discounts for early requests which permit efficient programming of spraying and cut moving time or hauling distance, or both. Incentives for prompt payment also could save money for both the farmer and the applicator.

It is not the purpose of this article to report or predict what

(*Continued on Page* 91)

Figure I

Cost Curves for Various Levels of Operation



Four Britten-Norman Micronair atomizers are attached to the plane in the above photo. Picture at bottom of page shows close-up view of atomizer and one type of attachment brackets. Droplet spectra can be changed from ultra fine to coarse simply by changing the pitch of the windmill blades.

Micronair Atomizing Spraygear Available For Various Aircraft

BRITTEN-NORMAN Ltd., Isle of Wight, England, has announced that attachment brackets have been designed and are available for installing the company's Micronair spraygear to Piper PA-18A, the DeHavilland Beaver and Tiger Moth, Lancashire EP 9, and Boeing Stearman aircraft.

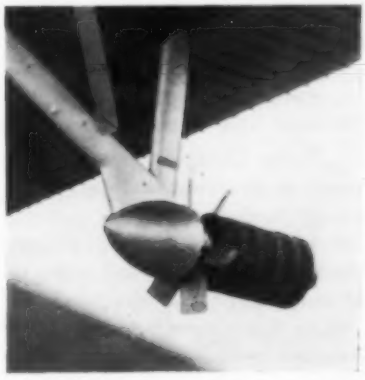
More than 200 aircraft are equipped with the atomizers and are being used by agricultural operators in such countries as Israel, Egypt, the Sudan, Southern Rhodesia, South Africa, East Africa, the Belgian Congo, French Cameroons, British Cameroons, French Guinea, Senegal, Canada, Jamaica, several republics in Central and South America, Sweden, and Yugoslavia. Although the equipment is expensive by comparison with boom and nozzle gear, it is immune from blockages and trouble-free.

Droplet spectra, varying from ultra fine (50 micron mmd) to coarse (500 micron mmd), may be selected simply by changing the pitch of the windmill blades driving the atomizer.

Britten-Norman offers two types of the atomizer. The A-100 series permits output per acre to be varied between ⅛ gallon per acre and five gallons per acre by variations in pressure supplied by the pump combined with the use of restrictor washers that are supplied with each atomizer. For heavy applications, up to 30 gallons per acre, the A-1500 atomizer has been designed for use on larger aircraft. The quality of atomization does not depend on variations in pressure of spray liquid supplied by the pump, which often is an advantage.

The equipment is particularly suitable for the application of insecticidal and fungicidal sprays to tall crops such as cocoa, bananas, and olives where thorough penetration of dense cover is essential. The atomizers also are useful for spray applications to dense field crops such as cotton, potatoes, peas, and beans. Experimental forest sprays indicate that a high penetration of foliage is achieved with the Micronair. Atomizers, however, are not recommended for herbicidal spraying when there is a drift hazard because of the fine nature of the droplet spectrum which provides coverage over a swath 60 yards wide.

Micronair equipment is standard on the Beaver aircraft of Desert Locust Survey at Arusha and was recommended to anti-locust delegates at the 1959 Rome Anti-Locust Conference.★



Timing Is The Essence Of Effective Defoliation

The final decision on when to defoliate depends on: the condition of the cotton plant; schedule of machine harvesting; status of boll rot; and weather conditions. The "ideal" time to defoliate for most complete leaf removal does not always coincide with the "ideal" time to defoliate for greatest benefits.

The article is taken from Chapter VI of a new book, "Concentrated Spray Equipment," by S. F. Potts. Published by Dorland Books, Caldwell, N. J.

TIMING, more than anything else, determines how much benefit a cotton grower can expect from defoliation. Unfortunately, there is no pat formula for figuring out when to apply defoliants and correct timing may vary from year to year, from region to region, and from farm to farm.

For any given farm there is an "ideal" time to defoliate for most complete leaf removal; but this does not always coincide with the "ideal" time to defoliate for greatest benefits. This is an important distinction because, after all, the object of defoliation is to benefit the grower.

If the grower does a careful job of planning and growing his crop, he will simplify the problem of determining the right time to defoliate. With this in mind, there are several things the grower should do. He should make every effort to get an even stand of cotton, in order to promote uniform plant development and boll maturity. He should use enough fertilizer and moisture to insure continuous plant growth. And he should follow state insect control recommendations and thereby prevent attacks which interrupt continuous development of a full boll load and interfere with defoliability.

Careful attention to the above points simplifies the problem of timing, but the final decision on when to defoliate depends on: the condition of the cotton plant; timing for machine harvesting; whether boll rot is a problem; and anticipated weather conditions.

Mature plants defoliate best and most completely. For best results, the boll-load should be heavy and vegetative development almost stopped. Plant and leaf moisture content must be high, because defoliation depends on the plant's being in an active state of growth. Bolls must be mature enough that yields will not be reduced or fiber and seed quality lowered. Little damage will occur when bolls are full-sized and firm to the touch. Where late bolls mature rapidly, there may be little loss of those 30 days old. Where bolls mature slowly, there may be damage to yield and quality of any bolls less than 35 to 40 days old at defoliation time.

When spindle picking is to be employed, applications should be made so that a once-over picking can be completed shortly after defoliation—before the plant can develop a second growth of leaves that are hard to remove with chemicals. This means that the grower

(*Continued on Page* 90)

DEFOLIATION GUIDE

Defoliation problems and practices vary widely in different parts of the cotton belt. Here are some of the general conditions that affect use of defoliation in main cotton-growing areas:

SOUTH ATLANTIC* and SOUTH CENTRAL.** Rainfall usually is ample; growth often profuse where fertility is adequate; dews frequent and heavy; plants seldom "cut-out" sharply unless late-summer drought occurs early in fall; defoliants usually applied when youngest bolls expected to make cotton are not less than 32 days old; picking normally can begin 7 to 10 days following application.

SOUTHWESTERN RIVER VALLEY.† Rainfall normally lower than in east; late-summer drought likely to toughen foliage; dews may be infrequent and short; plant growth and boll-load vary from excellent in fully irrigated locations to poor in dry-land sections; plants often cut out sharply in drier seasons but second growth may become profuse after early fall rains; youngest bolls should be at least 32 days old before defoliant application; leaf fall may be slower than in the east; higher application rates needed for drought-toughened and poorly-fruited plants.

WESTERN PLAINS.†† Season short and rainfall may be low throughout; plants short though heavily fruited, especially if supplemental irrigation is used; dews infrequent and don't last long; wind, arid climate, and drought often produce tough leaves that react slowly to defoliants and require higher rates; plants may cut out sharply; second growth usually delayed until fall rains; defoliant normally applied when youngest bolls are at least 35-40 days old. Leaf fall often slow; growers allow two or three weeks before stripping begins.

FAR WEST.*† Nearly all cotton of Acala variety; grows tall and leafy; usually fruits heavily; dews rare and short, though occasionally adequate for dust defoliation; strong desiccation tendency between last irrigation and time that top crop is mature enough to be undamaged by defoliation; bolls large, slow to mature; youngest bolls should be at least 35, often 40 days old at application time; second growth can be profuse if soil retains moisture from late irrigation, or if fall rains come after crop is fully mature.

*Includes North Carolina, South Carolina, Georgia, and Florida.

**Includes Alabama, Mississippi, Tennessee, southeastern Missouri, eastern Arkansas, and eastern Louisiana.

†Includes parts of western Arkansas and Louisiana, southeastern Oklahoma, and the Texas Gulf, the lower Rio Grande Valley, and the Black Belt areas of Texas.

††Includes high plains and rolling plains of southwestern Oklahoma and northwestern Texas.

*†Includes cotton areas of Arizona, California, New Mexico, and El Paso region of Texas.

Hahn Sprayer Brochure

Hahn, Inc., Evansville, Ind., has prepared a 16-page brochure on its 1960 line of Hahn Hi-Boy, self-propelled, high-clearance sprayers and accessories. The brochure illustrates the uses of high-clearance sprayers for corn, cotton, tobacco, and other crops. It is available from the company at 2000 N. 6th Ave., Evansville 7.

•

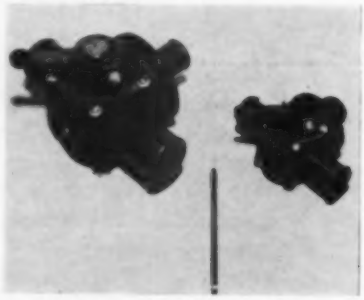
Pocket Calibration Card

Transland Aircraft, Torrance, Calif., is offering to aerial applicators a pocket-sized version of a U. S. Department of Agriculture spray calibration chart. The plasticized card, printed on both sides, provides a formula for determining the rate in acres per minute, at which spray or dry material can be applied and shows how to determine the number of acres covered.

The card is offered free to aerial applicators from the company at 2600 West 247th St., Torrance.

•

Spray Control Valves



Agricultural Aviation Engineering Co., Santa Clara, Calif., is offering a new line of light weight, corrosion resistant spray control valves for aerial spraying.

The valves incorporate an aspirator system in the by-pass port to create an immediate negative pressure on the full flow spray boom port when valves are actuated to the by-pass position. This is to provide instantaneous cut-off of spray nozzle flow at the end of each swath run. Valves are available with pipe threads, hose fittings, or tubing connections in the one-inch size for small aircraft or the two-inch size for larger aircraft.

Plant Provides Landing Strip

To facilitate servicing of agricultural aircraft, Barker Chemical Co. of Alton, N. Y., has provided a 2,000-foot landing strip adjacent to its plant. Airplanes will take on both liquid and dust insecticides directly from the Barker plant.

•

New Delavan Spray Nozzle

The Delavan Manufacturing Co., West Des Moines, Iowa, is offering a new spray nozzle, the tip of which is designed to offer additional coverage for spray booms at flow rates consistent with standard boom nozzles. Models of the nozzle are available from 5 gpa through 10 gpa.

The nozzles, Delavan BX, are manufactured as both single and double nozzles and offer additional coverage ranging from 104 inches for single hozzles to 194 inches for double nozzles. The nozzles are designed to be placed on the ends of the boom.

Johnny Unitas demonstrates newest H&W high strength-packaging paper . . .

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To learn how well your product can be *protected* by Expanda-Kraft, see other side . . .

EXPANDA-KRAFT

DEFIES SHOCK!

The bullet passes of Johnny Unitas have the terrific impact to rip through regular kraft (above), yet, thrown at the same speed, they bounce off Expanda-Kraft because of its greater resiliency (left). Johnny Unitas, all-pro quarterback of the Baltimore Colts, demonstrated the toughness of Expanda-Kraft at the National Packaging Show in Atlantic City. Each target consisted of four plies of 50-lb. basis weight stock. Time after time, in standard drop tests, bags made of Expanda-Kraft have proved their superior strength.

EXPANDA-KRAFT REDUCES BREAKAGE It has *two-way stretch*, soaks up shocks that would break ordinary kraft of equal basis weight.

EXPANDA-KRAFT WITHSTANDS MOISTURE *High humidity* and *weathering* have little effect on Expanda-Kraft! It retains its full toughness and firmness.

EXPANDA-KRAFT PRINTS SHARP This advertisement is printed on 50-lb. Expanda-Kraft White from a regular production run. Other shades print as well to enhance sales appeal.

EXPANDA-KRAFT BAGS STACK SECURELY They have a coefficient of friction higher than regular kraft bags, stack with less risk of slippage, stay in place while in transit.

EXPANDA-KRAFT BAGS FILL FAST They meet required porosity standards, yet are rigid enough to stand up to high speeds on the filling line.

Expanda-Kraft is the winner in impact test against regular kraft. Bags of each type were filled with sand, suspended on long ropes, sent hurtling toward each other. Regular kraft bag, photographed at high-speed as it burst, had same ply construction as Expanda-Kraft bag.

CONTACT YOUR MULTIWALL BAG SUPPLIER for information on the use of Expanda-Kraft where rigidity, resilience, strength, moisture resistance and uniformity are required. Expanda-Kraft is made by a new roll-crepe process and is available to multiwall bag manufacturers in 40, 50, 60, 70 and 80-lb. basis weights; White, Semi-bleached or Natural. *Hollingsworth & Whitney, Division of Scott Paper Company, Dept. G, Chester, Pa.*

HOLLINGSWORTH & WHITNEY DIVISION OF
SCOTT PAPER COMPANY

PEST ROUNDUP

By Kelvin Dorward

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Survey & Detection Operations, Plant Pest Control Division, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in U.S.D.A.'s pest surveys throughout the U.S.

Boll Weevil Activity On Increase in Cotton Areas

THE cotton boll weevil was becoming active in several states by the latter part of May. In the lower Rio Grande Valley of Texas, weevil activity was on the increase, with reports of punctured squares being 25 per 100. Adults were active and feeding as far north as Waco, Texas. Counts of adults in the Waco area, during the week ending May 20, averaged 58 per acre, compared with 74 during the corresponding week in 1959. In the Tallulah, Louisiana area, one out of three fields inspected was found to be infested with boll weevils. An average of 8 weevils per acre was found, with the range being 0-25. Weevil activity was rather low due to low temperatures and dry, windy weather.

During the week of May 20, only one field out of 20 examined in the Mississippi delta area was found to be infested with boll weevils. The infested field averaged 50 weevils per acre. In the Florence, South Carolina, area, weevil movement was still light by late May due to cool weather.

Thrips caused some damage to cotton during the month. In the Florence, South Carolina area, damage was reported, and moderate to heavy infestations were recorded in several southern Georgia counties. Thrips were numerous on alternate host plants in the Mississippi delta counties, but movement to cotton was rather slow. Although counts on cotton did not indicate injurious populations, some farmers were applying treatments.

Thrip populations were on the general increase in Texas from the lower Rio Grande Valley to Waco. Populations in general were light to minimum, but some injury was noted in the Waco area and as far north as the Red River. Heavy populations of thrips damaged seedling cotton in untreated fields of Dona Ana County, New Mexico. Cotton stands were being reduced in spots in some fields.

Treatments were applied for aphids on cotton by many growers in the Florence, South Carolina area. Aphids were present in practically every cottonfield in Allendale County, with some situations being serious. Natural enemies were giving some control. In Arizona and Texas, the cabbage looper was causing foliage damage in localized areas.

The pea aphid was perhaps the most widespread insect reported on during the month of May. Although the insect was reported generally throughout the country, only a few states recorded heavy populations. Heavy infestations of the pea aphid caused damage to areas of alfalfa in Torrance and Valencia Counties, New Mexico. In Kaufman County, Texas, populations on vetch were from medium to heavy.

Heavy populations of the pea aphid in southeastern Kansas caused many alfalfa fields to be cut early. Deposits of honeydew were heavy in some fields, causing cutting to be troublesome. By the latter part of May, populations of the insect in southern Illinois were increasing on red clover, but decreasing in alfalfa due to fungus disease. Counts up to 1,200 per 100 sweeps were recorded in alfalfa and up to 3,600 per 100 sweeps in clover. In central Illinois, populations up to 10,000 per 100 sweeps were recorded in alfalfa.

Although populations of the pea aphid were very high on alfalfa throughout Delaware early in May, populations were decreasing rapidly by the end of the month. Damage was evident in many fields. A fungus disease reduced populations of the pest on alfalfa and red clover in Maryland. Virginia recorded damaging populations, with conditions favorable for further buildup. Controls were recommended for the insect in Sandusky County, Ohio, where the counts were exceptionally high.

Grasshoppers were hatching in a wide area by late May but very few high populations had been reported by that time. In Bailey County, Texas, counts of *Aeoloplides turnbulli* were estimated at 600 per square yard on margins and 100 per square yard in the field. Some hatch was reported as far north as South Dakota and Wisconsin.

During April, counts were made for overwintering European corn borer larvae in several New Jersey areas. The average number of larvae per infested stalk was

(*Continued on Page* 89)

LISTENING POST

By Paul Miller

This department, which reviews current plant disease and insect control problems, is a regular feature of AGRICULTURAL CHEMICALS. The comments are based on observations of collaborators of the Mycology and Plant Disease Reporting Section, Plant Protection Research Branch, USDA, Beltsville, Md.

Sodium "Usnate" As An Antibiotic For Plant Diseases

PETER A. Ark, A. T. Bottini, and James P. Thompson (1), of the University of California, investigated the efficacy of sodium "usnate," an antibiotic derived from various lichens, against bacterial and fungus plant pathogens. Sodium "usnate" checked growth in culture of the Gram-positive tomato canker bacterium (*Corynebacterium michiganese*) but was not active against any of the several Gram-negative phytopathogenic bacteria on which it was tested. The antibiotic was toxic to spores of cucumber downy mildew (*Pseudoperonospora cubensis*), lima bean downy mildew (*Phytophthora phaseoli*), bean rust (*Uromyces phaseoli*), and the stone fruit brown rot fungus (*Monilinia fructicola*), the degree of toxicity depending upon concentration of the antibiotic and sensitivity of the organism. In greenhouse experiments with infected plants, sprays or dusts containing sodium usnate were effective against cucumber and lima bean downy mildews, bean rust, bean anthracnose (*Colletotrichum lindemuthianum*), brown rot on apricot, and powdery mildew (*Erysiphe polygoni*) of bean and cucumber. Here again, results obtained were related to concentration of the antibiotic and response of the pathogen. In general, dust formulations were more effective than sprays. Cucumber scab (*Cladosporium cucumerinum*) was not controlled by sodium usnate at any concentration used.

When humidity was excessive, treated bean and cucumber plants were injured, sometimes severely. The injury could be prevented by addition of chlorophyllin to the mixture.

Sodium "usnate" was stable in both spray and dust formulations. No systemic action in the plant could be demonstrated, according to Ark, Bottini, and Thompson.

Crown Gall Control

Peter A. Ark and James P. Thompson (2), of the University of California, obtained perfect control of crown gall (*Agrobacterium tumefaciens*) on apricot and peach and the similar disease, olive knot (*Pseudomonas savastanoi*), on olive by painting the galls with a drench containing streptomycin or terramycin or both in a mixture with iso-amyl alcohol, kerosene, vaseline, and lanolin. They adopted this combination because of specific, demonstrated properties of the different components. Streptomycin, painted on the wound (made by cutting out a gall) checked further development. The high capacity of kerosene and iso-amyl alcohol for penetrating crown-gall tissues, moved the antibiotic quickly into the galls. Small amounts of lanolin and vaseline slowed down movement of the antibiotic after penetration and thus provided more lasting effects and, also, prevented possible injury to healthy tissue at the edge of the gall.

Small to medium-sized crown galls were destroyed completely in 4 or 5 days. Olive knots were inactivated within a week. Neither disease had recurred when the experimental trees were discarded 6 months after treatment.

Bacterial Spot Development

Effect of different rates of fertilization on the development of bacterial spot of pepper is reported by Jack Taylor and J. W. Dobson, Jr. (4), of the Georgia Agricultural Experiment Station, who write that bacterial spot (*Xanthomonas vesicatoria*) of sweet pepper is important in the mountains of Georgia in seasons with frequent rainfall. Dependable control measures have not been developed. Severe outbreaks occurred in 1953 and 1959. During 1953 observations on pepper, fertilizer experiments suggested a correlation between fertilizer rate and bacterial spot incidence. In 1959, when the disease was again severe, Taylor and Dobson set up tests to study this relation and to explore the possibilities of using it as a means of controlling the disease.

They found that amount of bacterial spot did indeed decrease markedly and consistently as the rate of application was increased from none to the equivalent of 10,000 pounds per acre of 12:12:12 fertilizer. Particularly striking was the almost complete absence of bacterial spot from plants fertilized at the 5,000-pound rate. Injury, sometimes severe, that resulted from 5,000 and 10,000 pounds, the highest rates of application

(*Continued on Page* 87)

WASHINGTON REPORT

By Donald Lerch

WHAT would you tell six top-level Russian agricultural scientists about U. S. fertilizers and pesticides if you had the chance? That was the question faced by National Plant Food Institute and National Agricultural Chemicals Association when a six-man Russian team of scientists arrived in Washington.

In rapid fire order, the Russians were told that American trade associations are made up of companies with mutual interests, that they believe what is good for the American public is good for business, that the U. S. has made great progress in the use of agricultural chemicals, and that there has been no recorded fatality from the proper use of pesticides.

NPFI's Louis Wilson, NAC's Denis Hayley and Jack Dreessen, and USDA's Dr. Herbert Haller and Dr. Clarence Hoffman joined in answering the Russians' questions. The questions reveal as much of what Russians are doing in agricultural chemicals as was learned at the meeting, and deserve repeating.

Q. In the U. S. some 5,000 pesticides are sold. Why so many?

A. Constant research adds new materials every year which are more effective, less toxic, or better adapted to do specific pest control jobs; our competitive system permits companies to provide products they think farmers will buy; farmers have freedom to buy what they wish; and there are economic reasons which make certain chemicals and formulations attractive for certain uses or in certain areas of the country.

Q. There are many materials better than DDT. Why is DDT the top seller?

A. About half of DDT output goes into the World Health Organization's malaria eradication program, and there are economic reasons which appeal to some farmers.

Q. Can companies make and sell any pesticide they wish?

A. No. Companies research and manufacture chemicals, but their use and their safety must be cleared by the government. Recommendations are made by federal and state officials, their farmers buy and use what they want out of the materials offered within the limits set on safe use.

During the talks the Russians disclosed that they were fully aware of last year's cranberry and stilbestrol incidents, and disclosed that they are working on production of less toxic materials.

Following the talk, all of which had to be translated Russian to English and visa versa, the Russians picked up quantities of NPFI and NAC publications. These included NPFI's "Our Land And Its Care" and the "Plant Food Review" and NAC's "Pesticides and Public Policy", "Open Door To Plenty", "Pesticide Review", and the recent issues listing all U. S. pesticide tolerances.

Following the meeting with NPFI and NAC, the six Russians, led by Ilya Emelyanov, Deputy Administrative Head, USSR Ministry of Agriculture, continued on a 20-day tour of experiment stations, farms, and industrial firms to learn more about U. S. fertilizer and pesticide production, formulation and use.

Their apparent objective: to gather first-hand information that might help Russians boost their own farm production, and aid their campaign to outstrip the U. S. in per capita farm production in the shortest possible time.

The group was conducted around the country by USDA's Dr. Harold Shepard. Their stops included: Boyce Thompson Institute; Agricultural Research Service, Hoboken, N. J.; Agricultural Experiment Station, Cornell; New York State Agricultural Experiment Station, Geneva, N. Y.; Agricultural Experiment Station, University of Illinois; Spencer Chemical Company, Kansas City; Agricultural Experiment Station, University of Missouri; Missouri State Department of Agriculture; Delta Branch, USDA Experiment Station, Stoneville, Miss.; USDA Pink Bollworm Station, Brownsville, Texas; TVA, Muscle Shoals, Tenn.; and a wind-up in Washington, D. C. June 26.

Russian scientific tourists included: Llya Emelyanov, deputy administrative head, USSR Ministry of Agriculture; Stepan Kukalenko, senior scientist, Scientific Research Institute for Fertilizers, Insecticides and Fungicides; Ivan Palyakov, director, All-Union Institute for Plant Protection; Irakli Sinyagin, Director, All-Union Scientific Research Institute for Fer-

tilizers and Soil; and Tadzhitdin Zakirov, laboratory head, Scientific Institute for Cotton Growing.

* * * * *

The tour of Russian scientists is far from unique. About 75 groups from foreign countries make the rounds of U. S. Agricultural installations every year. That means one or more delegations a week, and the size of groups varies from two to twelve persons. Each tour includes a few days' briefing the foreign visitors on the American way of life and the American way of doing business.

* * * * *

NAC's newest publication, "Pesticides and Public Policy" mentioned in our last column, may rate as one of the most important the pesticide industry has yet produced. It traces the public attitude toward pesticides from the early 1900's, gives details of the hearings and investigations and the resulting public actions.

Already the booklet has been distributed to members of Congress, chairmen of State Senate and House Agriculture Committees, U. S. Pest Control officials, State Governors, extension entomologists, and the press. What is most encouraging to NAC is that some Congressmen are requesting extra copies to use in answering queries from constituents.

* * * * *

In the hectic final wind-up of Congress before the two major political party conventions, a series of measures affecting the pesticide and fertilizer industries were rushed to the floors of the House and Senate.

Most significant was the appropriations bill for the U. S. Department of Agriculture's Agricultural Research Service. After the House had pared USDA's proposed research budget of $68.9 million for 1961 to $67.9 million, the Senate increased the amount to $70.2 million. A compromise bill settled on $68.2 million, or about $500,000 more than ARS had for research in 1960.

Shifts within the total appropriated provide for putting an added $750,000 into research on spray residues, an added $950,000 for utilization research, and well over $350,000 extra for advance staffing of new laboratories for insect research on cotton and corn, and research on weeds.

The $52,236,000 approved by the House-Senate Conference Committee for plant and animal disease and pest control in 1961 included $2.4 million for continuance of the imported fire ant eradication program in the South. Surprisingly, this total amount of $52.2 million for control programs was about $4 million more than requested by USDA.

While not all differences between the House and Senate were resolved by the Conference Committee, passage of the USDA appropriations relating to research and pest control as the Conference Committee reported them seemed assured.

Also likely of passage in the last days of this Congress was a measure relating to color additives. In hearings on this measure, the Department of Health, Education and Welfare admitted that under the Delaney clause HEW now has no discretion once a conclusion has been reached that an additive is found to cause cancer when ingested by man or animal. Once that decision is made, the material must be banned. Passage of the new measure, as was expected, would allow discretion to HEW in application of the Delaney clause in the Food Additive Law under which the cranberry and stilbesterol incidents arose.

Still in doubt as to passage was a bill supported by some wildlife conservation groups to force USDA to seek approval of Federal and State Fish and Wildlife officials before starting any mass pest eradication or control program. This measure was opposed by the Department of Health, Education and Welfare, USDA, and the Department of Interior.

Major argument of the conservationists was that under present circumstances, the decision as to whether fish and wildlife should be sacrificed to gain some other goal through pest control is up to USDA alone. They want a law to put Fish and Wildlife officials formally in on the decision-making. In practice, of course Fish and Wildlife officials are always consulted when pest control programs are contemplated.

* * * * *

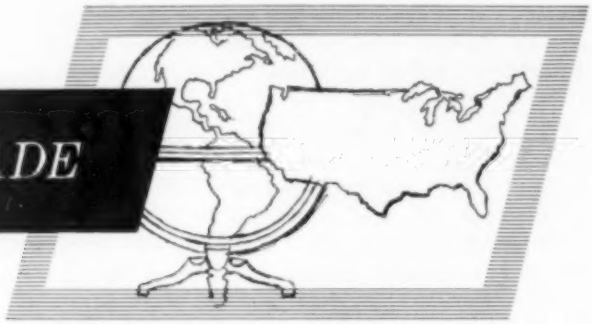
A renewed effort to step up the efficiency of dealers in selling fertilizers appeared to be one of the major trends running through the NPFI's annual convention at White Sulphur Springs. West Virginia. Some pesticide industry leaders with whom we've talked appear to be thinking along the same lines. The long-run future of both industries depends upon getting optimum use of fertilizers and pesticides by farmers.

While convincing farmers to use agricultural chemicals is complex, more people are coming to the conclusion that a key to the farmer's decision to buy or not to buy is the dealer. A recommended course of action is to provide dealers with the tools to help them do their job of selling more agricultural chemicals, and train salesmen to give dealers guidance which, some dealers, at least, claim they desperately need.

* * * * *

In a move stemming from a National Academy of Sciences symposium on pesticides and wildlife in January, the Academy has appointed a new committee to study ways in which plant protection can be carried out without any lasting damage to wildlife. The committee is viewed by both pesticide industry and wildlife groups here as a middle-of-the-road type of effort to find a reasonable common ground to end the fruitless and sometimes bitter wildlife-pesticide controversy.☆★

NEWS about the TRADE



Tobacco Growers Warned

The U. S. Department of Agriculture told tobacco growers that maleic hydrazide is making their tobacco taste bad and warned the growers to stop using the chemical if they want to preserve their markets.

Maleic hydrazide is used by growers to control sucker growth on tobacco plants. The USDA said that it has received "strong protests" against maleic hydrazide from the major tobacco companies. They complain that the chemical gives tobacco a dense, soggy leaf structure, poor taste, and poor burning characteristics.

The department's announcement stated: "The use of maleic hydrazide on tobacco to control sucker growth could seriously jeopardize the tobacco price support program and the domestic and export markets for U. S. tobacco." In the meantime, the department started an investigation of the problem at the request of Rep. Abbitt (D., Va.), chairman of a House Agriculture subcommittee. He warned growers "to go slow" on using the chemical until the government's study of its effects is completed.

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Northwest Nitro Elects

J. V. O'Leary T. B. Potter

James V. O'Leary has been elected president of Northwest Nitro-Chemicals Ltd., Medicine Hat, Alberta, Canada, and Tom B. Potter has been elected executive vice-president. Northwest is the Canadian agricultural chemicals affiliate of Commercial Solvents Corp.

Mr. O'Leary previously was general sales manager of Commercial Solvents and Mr. Potter had been Northwest's sales manager.

•

Chemagro Names Carnes

James L. Carnes has been appointed technical field representative for the eastern region by Chemagro Corp., Kansas City, Mo.

New President for S. B. Penick

Albert D. Penick has been elected president of S. B. Penick & Co., New York. He will succeed his brother, S. Barksdale Penick, Jr., who becomes chairman of the board. New vice-presidents are William A. Thawley and A. J. Dotres.

•

Zick Joins Velsicol Staff

Dr. Warren H. Zick has joined the research and development department of Velsicol Chemical Corp., Chicago, as agronomist-herbicide specialist. Dr. Zick formerly was with the U.S. Borax Research Corp.

•

Armour Appoints Sharp

Thomas E. Sharp has been appointed market development manager of the Armour Agricultural Chemical Co., Atlanta, Ga. Mr. Sharp, who joined Armour in 1951, has been with the research division of Armour and Co. in Chicago.

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Harvey Heads Midwest Region

Max J. Harvey has been named midwestern regional manager for the agricultural division of the American Cyanamid Co., New York. He replaces John H. Howard, who has been named national sales manager of all Cyanamid agricultural products.

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New Sulfuric Acid Plant

A new sulphuric acid plant at Pittsburg Chemical Co.'s Neville Island installation on the Ohio River has begun production. The company is a recently formed subsidiary of Pittsburgh Coke & Chemical Co.

American Cyanamid Establishes New Agricultural Center

AMERICAN Cyanamid Co. is developing a new Agricultural Center at Princeton, N. J., which will provide the company with the most modern facilities for laboratory research and development work, as well as practical field testing. Research operations of the company previously located at Stamford, Conn., are currently being moved to the new location, as well as the Lederle research laboratories previously located at Pearl River, N. Y. Following the move of the research and technical development departments to Princeton, the administrative offices will be moved in 1962, and eventually, in line with Cyanamid's program of decentralization, the entire Agricultural Division will be relocated at the New Jersey center.

The Princeton tract covers 640 acres, 500 of which are in crops. Fifteen acres are devoted to animal test activities. The staff of the research center will number 350, of whom a high percentage will be technical personnel trained in the various agricultural sciences.

Miller Licensed by Carbide

Union Carbide International Co. has licensed Miller Chemical & Fertilizer Corp., Baltimore, Md., to manufacture and distribute "658" fungicide, a copper-zinc-chromate complex, under all existing foreign patents.

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Texas Gulf Elects McBride

Dr. Guy T. McBride Jr. has been elected vice president of Texas Gulf Sulphur Co., N. Y. Dr. McBride joined Texas Gulf in 1958 after having acted as a chemical engineering consultant to the company for several years. In 1959, he was named manager of the research department.

•

Hou-Actinite Sales Agents

Ashcraft-Wilkinson Co., Atlanta, Ga., has been named exclusive sales agents for Hou-Actinite (Houston sludge) by the city of Houston, Texas. Sales will be concentrated in Texas and surrounding states, with a majority of the product going to fertilizer mixers and manufacturers.

•

Canadian Pesticide Sales Up

Canadian companies which manufacture pest control chemicals have reported an overall net profit of 2.8 cents per sales dollar on their 1959 operations. About one quarter of the number of firms engaged in pesticides manufacture participated in a recent survey conducted under the auspices of Canadian Agricultural Chemicals Association. This survey showed a total net income of $443,931 on total net sales of $15,526,008 in 1959. Although last year the net sales were higher by over $3,000,000 than in the previous year, the income after tax was lower at 2.8 cents per dollar compared to 3.3 in 1958.

The total net sales reported in 1959 represent over half the total dollar sales volume for agricultural dusts and sprays, livestock treatments, herbicides, household and industrial insecticides, rodenticides and sundry chemicals reported for the twelve months by the Dominion Bureau of Statistics. In the same period these companies paid approximately two cents per sales dollar in Federal and Provincial taxes on their income.

Since 1947, when the annual sales of pest control products in Canada amounted to $7,000,000 the volume of sales has more than tripled.

•

Eastman Appoints Sanders

John H. Sanders has been named sales manager of the Chemicals Division of Eastman Chemical Products, Inc., Kingsport, Tennessee. Eastman Chemical Products, Inc., is the marketing subsidiary in the United States and Canada for products manufactured by Tennessee Eastman and Texas Eastman company divisions of Eastman Kodak Company.

Mr. Sanders had been a regional sales manager in the E.C.P.I. chemical sales division with headquarters in Cleveland, Ohio. He succeeds Guy A. Kirton, who will concentrate on international sales of Tennessee and Texas Eastman products. Mr. Sanders has been connected with the Kingsport Eastman organization since 1946.

•

Sohio Names Bibbins Ag Mgr

James Bibbins was recently named agricultural sales manager for Sohio Chemical Co. He was formerly with Northrun King & Co., a seed producer.

Stauffer Names Two

John H.Kennedy has been appointed administrative assistant to the vice-president and general manager, agricultural chemicals division, by Stauffer Chemical Co., New York. He had been eastern sales manager. At the same time, Harold L. Straube was appointed eastern sales manager to replace Mr. Kennedy. He joined Stauffer in 1955.

•

Director of OM Construction

Ian D. Ritson has been appointed to the newly-created post of director of construction for Olin Mathieson Chemical Corp., New York. He had been project manager for Perini Ltd. in Toronto, Canada, a subsidiary of the Perini Corp., Boston.

•

Joint Biological Meeting

The American Institute of Biological Sciences is sponsoring a joint meeting of biological societies at Oklahoma State University, Stillwater, Okla., Aug. 28 to Sept. 1. Twenty-one societies are included.

Among the topics to be discussed are; fertilizer placement with vegetable and fruit crops, liquid fertilization, and effectiveness of fertilizer application.

Conference Held To Encourage Fumigant Safety

A CONFERENCE to encourage safe use of fumigants was held June 2 and 3 at Kansas State University, Manhattan, at the request of the Kansas State Board of Health and the Kansas Department of Labor. Others joining in sponsoring the conference were Kansas State University and the Kansas Grain and Feed Dealers Association. Approximately 300 attended.

Harold L. Smith, state commissioner of labor, indicated his department's concern for the protection of workers and said he favored an educational approach, in preference to regulatory measures, to bring about safer fumigation procedures.

It is dangerous to depend upon odor of the fumigant as a warning, Dr. W. F. von Oettingen, consultant to the Public Health Service, Bethesda, Md., told the conference. He warned that some fumigants are practically odorless and said a person tends to become less aware of an odor after he has smelled it for a short while. Common errors in use of gas maks and other safety devices were pointed out by S. J. Pearce, chief of the health research branch of the U. S. Bureau of Mines, Pittsburgh, Pa. Among the errors cited were the wearing of the wrong kind of mask, using the wrong kind of cartridge in the mask, and using masks that leak or do not fit. He said that there is a danger of entering gas concentrations higher than any gas mask can take care of.

Heads Agricultural Division

Clifford D. Siverd has been named general manager of American Cyanamid Co.'s agricultural division. He succeeds Frank S. Washburn who will retire in Sept.

Mr. Siverd has been assistant general manager of the division since March 1958. He joined American Cyanamid as a salesman in 1946 and was named assistant general manager of the farm and home division in 1957. B. F. Bowman, former marketing director of the agricultural division, has replaced Mr. Siverd as assistant general manager of the agricultural division.

•

Ammonia Plant For Sale

The General Services Administration is asking for bids on the San Jacinto (Texas) ammonia plant, built during World War II at a cost of approximately $20 million. The plant will be offered for public sale Aug. 1.

In addition to an operating ammonia plant and supporting facilities, the installation includes approximately 4,300 acres of land. It is reportedly the only property still available for industrial development on the deep-water Houston ship channel.

•

Monsanto Doubles Capacity

Monsanto Chemical Co., St. Louis, Mo., has begun production at a new facility in Nitro, W.Va., of Avadex and Vegadex. The new unit more than doubles the company's previous capacity for producing the two herbicides.

Avadex is a pre-planting herbicide for control of the wild oat and Vegadex controls annual grasses and certain broadleaf weeds in vegetables and some ornamentals.

•

Black Heads New Division

Frank F. Black has been appointed general manager of Cowles Chemical Co.'s newly-created chemical division. The new division was formed by combining the company's heavy chemical and organic chemical departments. Mr. Black had been manager of the organic chemical department. He is located at Cowles' general offices in Cleveland.

•

Gen. Totman Joins Summers

Brigadier General Clayton O. Totman, recently retired from the U. S. Marine Corps., has joined Summers Fertilizer Co., Baltimore, Md., as assistant vice-president. Among his duties will be the development of a new soil & forest conservation division for the company.

General Totman served with the Marine Corps for 25 years prior to his retirement Nov. 1, 1959. His service covered a wide range of duty in the Far East and Alaska, and his final assignment was as special assistant to the Secretary of the Navy developing policy and management of the Navy's programs for conservation of soils, water, forests, grasslands, fish, and wildlife in its more than 750 installations of all types throughout the world.

•

New Ammoniating Solution

A new ammoniating solution that is said to promise premium quality conditioning of pulverized mixed fertilizers is being offered by E. I. du Pont de Nemours & Co., Wilmington, Del. Called Uramon Ammonia Liquor-K (UAL-K), the new solution contains 40 per cent nitrogen.

Commercial trials wtih pulverized 5-10-10 have indicated that the conditioning advantages provided by methylene ureas minimize bag caking and improve handling properties on the farm.

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Rocky Mountain Conference

The 31st annual meeting of the Rocky Mountain Conference of Entomologists will be held at the Cameron Pass 4-H Club Camp near Gould, Colo., Aug. 7 to 11.

•

Geigy Names Westmoreland

Geigy Agricultural Chemicals Division of Geigy Chemical Corp., Ardsley, N. Y., has appointed William G. Westmoreland as sales representative in North and South Carolina, east Tennessee and north Georgia. He had been agronomy specialist in weed activities with the N. Carolina Extension Service.

Du Pont Wins Damage Suit

A $118,011.02 damage suit against E. I. du Pont de Nemours & Co., Wilmington, Del., alleging weed killer injury to cotton crops in 1957 and 1958, resulted in a jury verdict for Du Pont in the Arizona Superior Court in Tucson May 26.

The plaintiff, A. S. & R. Farms, Inc., had filed suit May 22, 1959, alleging that Du Pont's Monuron weed killer, applied to 716 acres at lay-by time in 1957, injured cotton crops both that year and the next.

Technical evidence, presented by authoritative witnesses, during the trial, indicated that the use of the herbicide was a sound practice and is based on extensive trials in many areas. Witnesses cited successful treatment of hundreds of thousands of acres during the past five years and evidence also was introduced to show that yields from the plaintiff's fields in 1957 may have been reduced substantially by cotton wilt disease and certain other factors, not related to the use of the herbicide.

•

Dow International Appoints

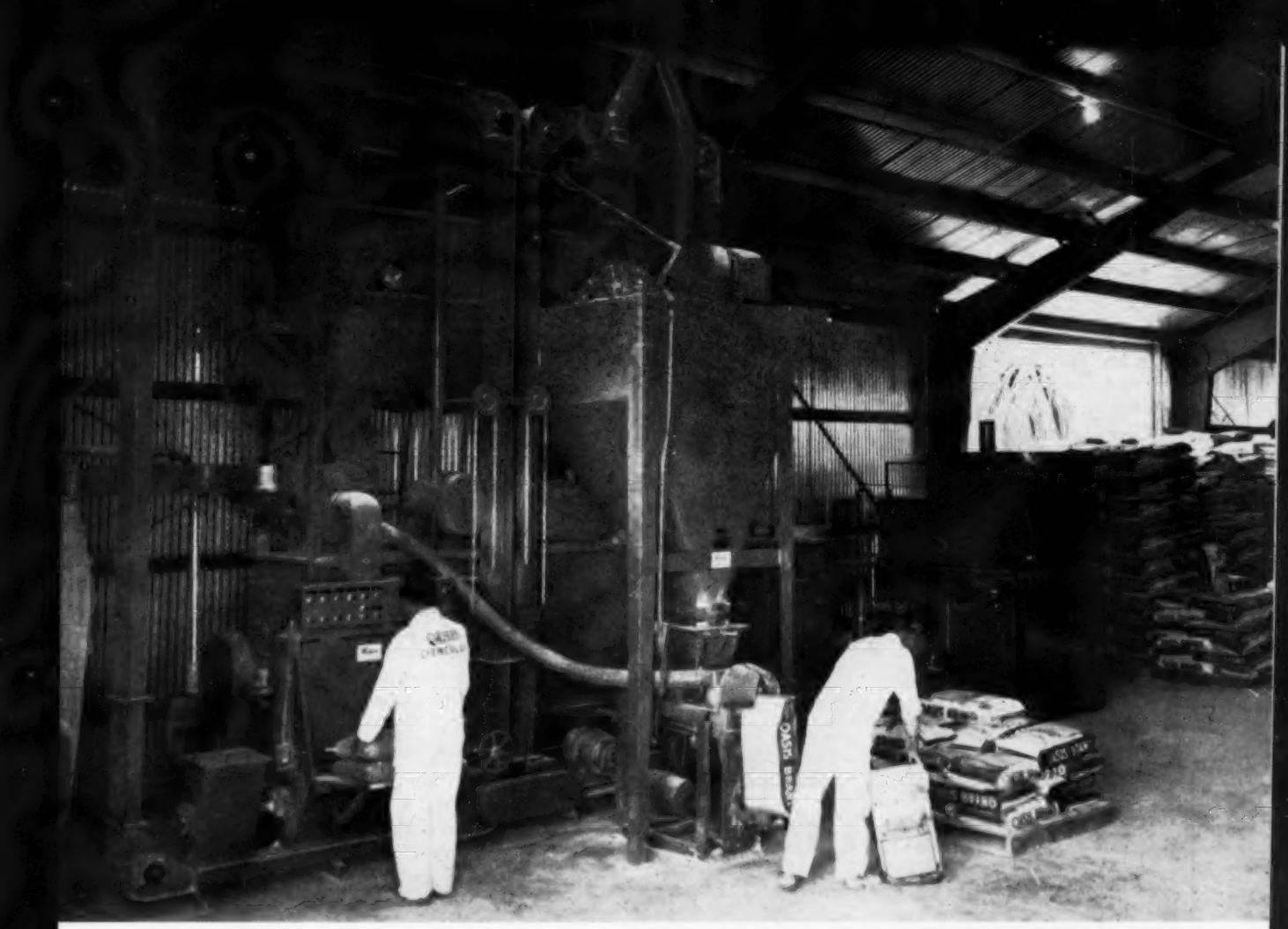
Dr. Wendell R. Mullison has been assigned new responsibilities as product manager in charge of international sales of herbicides, soil fumigants, and space and commodity fumigants by Dow Chemical International Ltd., S. A. Dr. Mullison, who has been with Dow since 1946, has worked in agricultural chemicals for Dow International since 1953.

•

Construction Plans Dropped

North Dakota Nitrogen Co., Bismarck, has abandoned plans to build a $15 million fertilizer plant in North Dakota. The company's office will close this month "pending future developments", according to announcement from George C. Van Nostrand, president.

A continually tightening money market during the past 18 months resulted in a lack of loan capital to finance the project, he said. The company was founded in 1958.



IF YOU MIX, GRIND, OR BLEND- POULSEN'S *R. T. R.** UNI-BLENDER SOLVES MANY OF YOUR PROBLEMS

In the field of fertilizers and insecticides, the Poulsen Uni-Blender is our standard unit—a plant that's *Ready-To-Run. It mixes, elevates, grinds, and bags. Impregnates liquids with diluent mixes.

If your product deteriorates from long delays in shipping, you want to deliver a fresh product . . . the Uni-Blender can do it!

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This unit can handle four to six, 1200 to 1500 lb. batches of field strength dust per hour. Other capacities are available.

Requires only 9' by 12' floor space and 16' headroom. Factory pretested and ready to go to work for you just two days after delivery.

We design and build complete plants. If you need specially designed equipment, tell us the problem. There always seems to be a solution.

Poulsen company

Engineers and manufacturers of materials processing and materials handling equipment

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PARTIAL LIST OF TYPICAL USERS

DOMESTIC

Arizona Fertilizers, Inc.	Phoenix, Arizona
Mathieson Chemical Corp.	Phoenix, Arizona
Niagara Chemical Div. (FMC)	Richmond, Calif.
Miller Products Co.	Portland, Ore.
Stauffer Chemical Co.	Richmond, Calif.
American Potash & Chemical Co.	Los Angeles, Calif.
Cotton States Chemical Co., Inc.	West Monroe, La.
Pennsalt Mfg. Co. of Wash.	Portland, Oregon
Thompson-Hayward Chemical Co.	Lubbock, Texas
Tide Petroleum Prod. Co.	Edenburg, Tex.
Diamond Alkali Co.	Cleveland, Ohio

EXPORT

Pennsalt International Corp.	Mexico City
Stauffer de Mexico, S.A.	Culiacan, Mexico
Niagara Chemical Division	Culiacan, Mexico
Tropical Agriculture, S.A.	Havana, Cuba
Geigy Do Brasil, S.A.	Rio De Janeiro, Brazil
DuPont (Peru) S.A.	Callao, Peru
Compania De Petroleo Shell de Columbia	Barranquilla, Colombia
Allied Chemical Services Ltd.	Calgary, Canada
Alianca Commercial De Anilinas	Sao Paulo, Brazil
Bayer Agro Chem Corp.	Bombay, India

GENTLEMEN: *Please send me your technical bulletin about the standard unit Uni-Blender.*

NAME .....

COMPANY .....

ADDRESS .....

CITY ..... STATE .....

Geigy Appoints Jefferson

Raymond R. Jefferson has been appointed a sales representative for Geigy Agricultural Chemicals Division of Geigy Chemical Corp., Ardsley, N.Y. He represents the company in Ind. and Kty.

•

Stephenson Names Hoskins

James H. Hoskins has been appointed vice-president and general sales manager of the Stephenson Chemical Co., College Park, Ga. He had been district representative of the Lethalaire Division of the Virginia Smelting Co.

•

Gypsy Moth Survey Underway

The Plant Pest Control Division of the U. S. Department of Agriculture is setting out approximately 16,500 traps in New York this summer to check the effectiveness of past gypsy moth spray programs. The traps will be checked weekly until early September.

African Bird Attacks Crops

African countries are joining together in a campaign against the weaverbird, which is considered a menace to crops in 20 per cent of the continent. In swarms of millions the birds devour crops over hundreds of thousands of square miles from Senegal to the Transvaal, sometimes driving villagers from their communities because their harvests have been obliterated. In the northern Transvaal, in 1953, sorghum losses alone were estimated at $1,100,000. The bird has seriously impaired production of rice in northern Nigeria and, in Kenya and Tanganyika, the wheat crops have suffered grave damage.

Every weapon so far employed against the weaverbird has failed. They include noises to frighten the birds; low-flying aircraft with smoke producers; poisoned bait, which involved dangers to African farmers; air-spraying with parathion, which was effective but also risky; and biological control through Newcastle disease, fowl pox, and similar infections, which only confirmed the bird's resistance to disease.

The impending international control project will enroll biologists, meteorologists, and other scientists in what is termed a "military operation." They will begin a consistent study for maximum effectiveness and again take to the field against the weaverbird. Many existing techniques will be continued and new ones added.

•

Hercules Shifts Two

A new director of development and a new manager of the Chicago sales district of the Naval Stores Department have been appointed by Hercules Powder Co., Wilmington, Del.

Richard J. Both, formerly manager of the Chicago sales district, has been named director of development for the Naval Stores Department. He is succeeded by Elwin S. Pilchard who had been a senior technical sales-service rep.

Can be used as close as one day before harvest!

Phosdrin®

INSECTICIDE

Phosdrin insecticide control chart

CROP	INSECT	INTERVAL BETWEEN LAST APPLICATION & HARVEST*
FRUITS Apples Pears Peaches Plums	Aphids Mites Grasshoppers Lygus bugs Red-banded leaf roller	1 day
Strawberries 	Aphids Mites Strawberry leaf roller Grasshoppers, Salt-marsh caterpillar, Lygus bugs	1 day
Grapes 	Aphids, leaf folder, leaf hoppers, mites, red-banded leaf roller, Lygus bugs	5 days
VEGETABLES Broccoli Brussels sprouts Cabbage Cauliflower Collards Kale	Aphids Cabbage looper Imported cabbageworm, leaf hoppers, Salt-marsh caterpillar, Mites, Cutworms (climbing), Dipterous leafminer (adult), Lygus bugs, Grasshoppers	1 day on broccoli and cabbage; 3 days on others
Turnips Turnip Tops Mustard Greens 	Aphids, Cabbage looper, Imported cabbageworm, False chinch bug, Dipterous leafminer (adult), Grasshopper, Leaf hopper, Mites	3 days
Beans Cucumbers Tomatoes 	Aphids, Leaf hoppers, Mites, Grasshoppers, Mexican Bean Beetle	1 day

CROP	INSECT	INTERVAL BETWEEN LAST APPLICATION & HARVEST
VEGETABLES (cont.) Lettuce 	Aphids, Cabbage looper, corn earworm, cutworms (climbing), Dipterous Leafminer, (adult) Imported cabbageworm, Grasshoppers, Leaf hopper, Mites, Lygus bugs, Salt-marsh caterpillar, False chinch bug	2 days
Onions (including green onions)	Thrips, Cutworms (climbing)	1 day
Spinach 	Aphids, Cabbage looper, Imported cabbageworm, Grasshoppers, Leaf hopper, Mites, Dipterous Leafminer (adult), Cutworms (climbing), Salt-marsh caterpillar, False chinch bug	4 days
FIELD and FORAGE Alfalfa, Clover (Seed and Hay)	Aphids, Grasshoppers, Leaf hoppers, Cutworms (climbing), Mites, Lygus bugs Alfalfa weevil larvae	1 day
Corn (Field, Sweet, and Popcorn)	Aphids	1 day
Sorghums	Aphids Corn earworm	3 days
Pea Vines, Peas, Potatoes 	Aphids, Grasshoppers, Leaf hoppers, Mites	1 day

READ THE DIRECTIONS ON THE LABEL AND FOLLOW THEM AT ALL TIMES

*Intervals and tolerances established by U.S.D.A. and F.D.A. as published in Federal Register, Oct. 11, 1957.

For latest technical information on Phosdrin and its applications write to:

SHELL CHEMICAL COMPANY

AGRICULTURAL CHEMICALS DIVISION, 110 West 51st Street, New York 20, N.Y.

SHELL

Heads Heyden Division

Robert M. Aude has been appointed president of the Heyden Chemical Division of the Heyden Newport Chemical Corp. He had been vice president and general manager of the division since 1958.

•

Forest Herbicides Symposium

A symposium on herbicides and their use in forestry is scheduled to be held Aug. 30 and 31 at Pennsylvania State University, University Park, Pa. The symposium is being sponsored by the Pennsylvania Department of Forests and Waters; Northeastern Forest Experiment Station, U.S. Forest Service; Department of Forest Management, Penn State; and the New Jersey Dept. of Conservation and Economic Development.

•

Staley Names Walmsley

W.Harry Walmsley has been named to the newly-created position of assistant general superintendent of the manufacturing division of A. E. Staley Manufacturing Co., Decatur, Ill. He is replaced by G. James Dustin as plant superintendent.

•

Potash Firms, Unions Agree

Potash companies with production facilities at Carlsbad, N. Mex., have reached agreement with negotiating committees of four unions on new two-year labor contracts. Most locals of the unions have ratified the agreements, which would boost wages eight cents an hour the first year and nine cents an hour the second year, in addition to other benefits.

Meanwhile, other leading potash producers disclosed they are raising prices on agricultural grades by about $1.80 a ton, effective July 1, following a pattern set by U. S. Borax & Chemical Co. U. S. Borax, which announced the price increase last April, also disclosed that it is increasing the price of potassium chloride by about $2 a ton.

Bagpak Names Worthington

R. R. Worthington has been appointed assistant general manager of the Bagpak Division of International Paper Co., New York. He joined International Paper as a chemist in 1934 and has been a member of the Bagpak sales staff since 1936, being named divisional manager in 1954.

Succeeding Mr. Worthington as sales manager will be R. A. Gair Jr.

•

Hardware Show Oct. 10 to 14

"Preview to profits" will be the theme of the 15th annual National Hardware Show to be held Oct. 10 to 14 at the Coliseum in New York. More than 40,000 buyers are expected to attend and, for the fifth consecutive year, the show will occupy all of the Coliseum's more than 300,00 square feet of display space.

Two floors will be devoted to lawn, garden, and outdoor living products and light farm equipment.

Jones Named Sales Aide

L. W. Jones has been named sales aide in the Davenport Division of Armour Agricultural Chemical Co., Atlanta, Ga. Mr. Jones will assist in the supervision of Armour's fertilizer sales activities in Davenport, Fla. He joined the company in 1949.

•

French Named To New Post

John L. French has been named general sales manager of the fertilizer division of Virginia-Carolina Chemical Corp., Richmond, Va. He succeeds A. P. Gates, who recently was elected a vice president of the company.

•

Test Well Successful

Texas Gulf Sulphur Co. has experienced favorable results from its first test well on potash leases in southeastern Utah. The well was completed one month following the signing of an agreement under which Texas Gulf will acquire and commercially develop the extensive Utah potash properties of Delhi-Taylor Oil Corp.

The test results were consistent with earlier estimates of the thickness and grade of the potash strata, according to Texas Gulf. Two more wells are being drilled.

•

Florida Suit Loses Round

Circuit Judge Edwin Jones in Jacksonville, Fla., last month denied a request for an injunction prohibiting the State Board of Health from regulating the use of pesticides. The suit was brought by Richard L. Lewis for the Florida Pest Control Association. It said that the State Department of Agriculture had power to regulate use of pesticides—not the Board of Health.

The Board of Health had placed 12 pesticides on a dangerous and restricted list in accordance with new state licensing regulations. (See *Agricultural Chemicals*, June, 1960, page 67.) Judge Jones said that the grounds on which the suit was brought were insufficient. He said a hearing would be necessary before he could rule on whether the suit should be dismissed.

Remember How They Used To Pick Them Off?

Witchweed Campaign Starts

The 1960 eradication program against witchweed is under way in North and South Carolina, the U. S. Department of Agriculture reported last month. About 117,000 acres of infested land on 6,094 farms in the two states are being treated.

More than 5,000 acres have been treated this year, on an experimental basis, with a new herbicide —2,3,6-trichlorophenylacetic acid — which in the research program last year gave effective, full-season control of witchweed in corn without injury to the crop. The experiments showed that the new herbicide, which is disked into the soil 10 to 14 days before crop planting time, not only prevented emergence of witchweed but also controlled other weeds throughout the growing season.

An estimated 98,000 acres will be treated with 2,4-D as soon as the first witchweed appears above ground. Last year some 72,000 acres were treated. About 12,500 acres will be under cultural treatment this year.

•

Kaolin Fertilizer Conditioner

In the *Agricultural Chemicals'* review of fertilizer conditioners last month (June issue, pages 54, 55), we omitted a well known product for improving mechanical condition of plant foods, "Tako," which is offered by The Thomas Alabama Kaolin Company, 2412 Ken Oak Road, Baltimore 9, Md.

"Tako" fertilizer grade is an airfloated colloidal kaolinitic kaolin. It contains no mica or alkalies, and is reported to be practically chemically pure. The particle size is listed as follows: minus 1 micron, 55%; minus 2 microns, 68%; minus 5 microns, 85%

The product is suggested as a coating agent or conditioner of granulated or prilled high analysis fertilizers, to eliminate bag set in storage.

A high grade colloidal kaolinitic kaolin crude is also offered for formulation of agricultural pesticides.

Vogel Is District Manager

Joe R. Vogel has been appointed Philadelphia district manager by the Richardson Scale Co., Clifton, N.J.

•

Rename Grand River Div.

The Grand River Chemical Division of Deere & Co., Pryor, Okla., has been renamed the John Deere Chemical Co.

In keeping with Deere's decision to extend greater autonomy to the chemical operation, the new company has its own officers and board of directors. Officers are W. W. Yeandle, president; R. B. Ady, vice president; and K. B. Smith, secretary-treasurer.

•

Niagara Adds Hansen

J. Dean Hansen has joined the staff of the Jackson, Miss., branch laboratory of Niagara Chemical Division of Food Machinery & Chemical Corp.

Korea Plans More Plants

The Korean Agriculture-Forestry Ministry is preparing a $132 million plan for the construction of three additional fertilizer plants aimed at meeting the nation's demand for nitrogenous and phosphate fertilizers.

In the planning, the ministry estimates the national requirements of nitrogenous fertilizer at 844,000 tons, phosphate at 431,000 tons, and potash at 17,000 tons. According to the plan, the existing plants at Chungju and Naju will produce an annual 170,000 tons each of nitrogenous fertilizer and another 504,000 tons will be produced by the three new plants. All the required phosphatic fertilizer must be produced at the new plants and the required potash fertilizer will continue to be imported.

•

Lists Record Earnings

American Cyanamid Co.'s first quarter sales and earnings from operations were the highest for any quarter in the company's history, Thomas L. Perkins, board chairman, told shareholders recently at the firm's annual meeting in Portland, Me.

Net earnings for the first three months of this year showed an improvement of 27 per cent over the corresponding period in 1959.

•

Appointed To Project Sales

Henry W. Hitzrot has been appointed to the project department of Dorr-Oliver Inc., Stamford, Conn. He has been with the company since 1927.

In the project department, Mr. Hitzrot is concerned with development and sales of complete phosphate rock, phosphoric acid, and fertilizer processing units.

•

Architect Award To IMC

International Minerals & Chemical Corp.'s administrative and research center in Skokie, Ill., received the American Institute of Architects' "Award of Merit" for 1960 at the recent annual A.I.A. convention in San Francisco.

Dr. Sauchelli to Study Indian Fertilizer Market

DR. Vincent Sauchelli, chemical technologist on the staff of the National Plant Food Institute during the past three years, following his retirement from Davison Chemical Co., Division W. R. Grace & Co., now embarks on another facet on his lengthy career in the agricultural chemical field. Dr. Sauchelli leaves in mid-August for India in the interests of the Phosphate Scheme of India, a non-profit, private organization devoted to market development and promotion of information on agronomic and manufacturing phases of phosphates in agriculture. He will spend six months in that far-off country investigating market development and the potential for American phosphate interests and developing educational programs. On his way to India, Dr. Sauchelli will make a stopover in South Korea to investigate local developments in marketing and agronomic testing of phosphates. On his return to the United States early in 1961, he will devote full time to consulting work on problems in the agricultural chemical industry in which his long experience and training make him competent. He will continue his association with the National Plant Food Institute as a consultant.

Dr. Sauchelli's 45 years experience in agricultural chemical work includes market development, research and sales. During his 21 years at Davison Chemical he pioneered in agronomic research and the marketing of granulated fertilizer. Davison was the first company in the United States to manufacture granulated superphosphate and granulated mixed fertilizer commercially.

Before the Davison association, Dr. Sauchelli was director of the agricultural experiment station in Ligonier, Pa., for Koppers Research Corp., where he supervised research

Dr. Vincent Sauchelli

projects involving agronomy, plant pathology, entomology and horticulture. The main objectives were to find agricultural uses for coal and coal tar derivatives. Under his direction some of the early investigations on Oberphos, the pioneer granular superphosphate, were carried out; also ammonium thiocyanate was developed as a weed killer and corrosion inhibitor and flotation sulfur as a fungicide, the latter product, recovered from coke-oven gas, following its development, became the ranking sulfur fungicide for years.

In addition to his work in the domestic field, Dr. Sauchelli has also spent six years professionally in the Orient. He was director of research of the Research Laboratories of the Societé Internationale de Plantations et di Finance, at Kuala Lumpur in the Federated Malay States, an organization supported by British, French and Belgian plantation rubber interests. In this capacity, Dr. Sauchelli was responsible for soils and fertilizer research and disease and pest control in 175,000 acres of rubber plantings in Malaya, Java and Sumatra. He was particularly concerned with establishing high yielding clones of Hevea rubber trees, through the selection of high yielding "mother trees" as sources of buds for grafting onto selected seedlings. In the years following his work in the Malay States, Dr. Sauchelli extended his interests to foreign agricultural studies to include most of the European countries. He has a working knowledge of some 6 languages, and has translated for American interests reports appearing in many foreign publications.

He has written numerous articles on fertilizer technology, production, use and marketing for a number of American (and foreign) technical and trade magazines. He is also the author of two basic, well-known books in the fertilizer industry: "Phosphates in Agriculture" and 'Manual on Fertilizer Manufature." In addition, he was editor in chief of a Monograph just published by the American Chemical Society, titled "The Chemistry and Technology of Fertilizers."

Dr. Sauchelli has been an unusually active member of a series of technical societies and trade groups, including the American Chemical Society, American Society of Agronomy, National Plant Food Institute and other trade associations. He has been chairman of various committees for the ACS, and in 1945-50 as chairman of the Industry Committee on Radioactive and Tagged Element Research, was among the first scientists investigating the application of radioisotopes to agricultural problems. This Committee participated in the training of scientists in the use of radioisotopes in agriculture.

He probably is best known in the fertilizer industry for founding and organizing the Fertilizer Industry Round Table, which this years will celebrate its 10th anniversary. Through Dr. Sauchelli's endeavors, practical production men in the fertilizer industry have been encouraged to meet and exchange information on techniques, handling and chemical control problems. Dr. Sauchelli has always recognized the importance of working *with* contemporary research and production men, and has tried to impress on co-workers in the fertilizer industry a belief that the industry can progress most rapidly through cooperation and the ready exchange of operating data and research findings.

Monsanto To Expand Plant

Monsanto Chemical Co. has begun construction in Anniston, Ala., on a 50 per cent expansion of its manufacturing plant for parathion and methyl parathion. The expansion, scheduled for completion in November, will give the plant an annual capacity of 18 million pounds of these products.

•

Adolph H. Sterne Dies

Adolph H. Sterne, vice president of the Tennessee Corp., Atlanta, Ga., died May 5. He had been ill for two weeks.

Mr. Sterne joined the Tennessee Corp. in 1919 and, during his 41 years with the company, had been active in the marketing of sulfuric acid to the fertilizer and chemical industries.

•

New Calif. Fertilizer

Stauffer Chemical Co., Shell Chemical Co., and Western States Chemical Corp. have announced plans to form a new company to produce a full line of complex solid fertilizers for the western market.

A plant is to be constructed adjacent to Stauffer's plant at Dominguez, Calif., and is expected to be in operation in early 1961.

•

Dorr-Oliver Names Scott

Charles H. Scott has been named chief mechanical development engineer by Dorr-Oliver Inc., Stamford, Conn. He has been with the company for 33 years, most recently handling engineering coordination as well as mechanical development with the development engineering department.

•

Dinwiddie To New Post

H. A. Dinwiddie has been appointed a special representative of Union Carbide Plastics Co., division of Union Carbide Corp., New York. He has been a technical representative in the company's metropolitan New York sales region, handling the sale of Bakelite Brand plastics for flexible packaging.

Floyd To New Position

West Virginia Pulp and Paper Co., New York, has named John Floyd to the newly-created position of technical sales service manager for its multiwall bag division.

Mr. Floyd joined West Virginia in 1954 and has been packaging engineer at the company's multiwall packaging laboratory at Charleston, S. C. Most recently, he was technical sales service manager, Northern Region.

•

Fertilizer Destroyed In Fire

Twenty tons of ammonium nitrate fertilizer were consumed by a fire recently in a warehouse at the Boron, Calif., plant of U.S. Borax & Chemical Corp. Also in the building were bales of paper sacks and a fork lift. The loss was estimated at $100,000. The ammonium nitrate fertilizer, which was stored in the manner and in quantity that was in accordance with recommended methods, burned without incident.

Fertilizer Exports To Drop

U. S. exports of nitrogenous fertilizers are expected to decline 37.5 per cent in the next year—from 160,000 metric tons of nitrogen to around 100,000 tons, according to a study by the Organization for European Economic Co-operation on fertilizer production, consumption, prices, and trade.

Meanwhile, exports of eight European nitrogen-producing countries are expected to increase by 10 per cent—to 2,029,000 tons from a current level of about 1,840,000 tons. Consumption of nitrogenous fertilizers in the 18 countries of the OEEC is due to go up by approximately 7 per cent to 3,125,000 tons. A production rise of 9 per cent to 4,597,000 tons is forecast, and imports are believed to be in for a drop of 9 per cent to 532,000 tons.

The OEEC study shows considerable national variations in price structure, particularly when payment of government subsidies to farmers is taken into account. In most countries, however, prices have been relatively stable over the past few years.

•

Howard Heads Sales

John H. Howard has been named sales manager for the Agricultural Division of American Cyanamid Co., New York. He had been regional manager for the midwest region.

Mr. Howard joined American Cyanamid in 1955 and was in charge of national sales of Acronize. He is replaced as midwestern regional manager by Dr. Max J. Harvey.

•

Tom Jones Joins Gilman

Tom L. Jones, formerly vice president and director of mutiwall sales for Arkell & Smiths, and recently regional sales manager of the multiwall division of West Virginia Pulp and Paper Co., has joined Gilman Paper Co. as special representative in the multiwall bag division.

In other moves announced by the company, Harry C. Lawless was named staff vice president and Dean Wellington was named general sales manager of the company and its subsidiaries.

•

Residue Study Planned

The University of California has outlined an expanded research campaign on chemical residues on foods. Supported by $171,000 in state-budgeted funds, U. C. staff members will study all types of chemicals used in agriculture.

Extension entomologist John E. Swift will co-ordinate the statewide program from the campus at Berkeley.

•

ACS Meeting Sept. 11

The 138th national meeting of the American Chemical Society will be held Sept. 11 to 15 at the Statler-Hilton Hotel in New York. A Chemical Exposition will be held in conjunction with the meeting.

•

Heads Dow Resale Section

W. L. Corbin has been named manager of the resale products section of agricultural chemicals sales for the Dow Chemical Co., Midland, Mich. In this capacity, he is in charge of marketing all products sold through Dow's retail farm dealer organization.

Urea Costs In Error

In the report of the Southern Regional Liquid Fertilizer Conference titled "Cost of Producing Liquid Fertilizers Higher than for Solids" in the March 1960 issue, page 48, the delivered costs of urea-ammonium nitrate solution used in developing cost data presented in the table are in error. The cost of the urea-ammonium nitrate solution used in some of the liquid grades was based on an f.o.b. price of $1.28 per unit of nitrogen rather than the correct value of $1.60 per unit of nitrogen. Using the correct value, total costs of producing the liquid fertilizers as presented would be increased by about 1.5 per cent for grades with $N:P_2O_5$ ratios of 1 to 2, about 3 per cent for grades with $N:P_2O_5$ ratios of 1 to 1.33, and about 4.5 per cent for grades with $N:P_2O_5$ ratios of 1 to 1. The cost of producing liquids with $N:P_2O_5$ ratios of 1 to 3 would not be altered, since in the urea-ammonium nitrate solution is not required.

Wisconsin Committee Reports On Study Of Pesticides

A COMMITTEE of health and nutrition authorities, appointed by Wisconsin Governor Gaylord Nelson to study hazards to health arising from the use of chemical food and feed additives, reported last month that "at the present time there is no scientific basis for serious alarm over the safety and quality of foods available to the American people."

The committee said that federal legislation provides an adequate legal framework for maintaining the safety and quality of food and added that the research scientists, enforcement officers, and administrators who are responsible for guarding the safety of our foods are public servants of unusual dedication and integrity. The report continued that "health hazards can be created under ordinary conditions only when pesticidal chemicals are improperly used."

Referring to the Delaney Clause of the 1958 amendment to the Federal Food, Drug, and Cosmetic Act, the committee said that it fails to take into account that chemicals which may be hazardous in large quantities and under conditions of unusually long exposure, are harmless under conditions which would be encountered in ordinary circumstances. The committee urged "the exercise of what might be termed a rule of reasonableness in evaluating these problems."

Quebec Fertilizers Association Elects Officers

New officers of Quebec Fertilizers Inc. were elected at the annual meeting of the association, June 7, at Mt. Gabriel, Que. Shown are: (left to right) Harold Barrett, Canadian Industries Ltd., vice president; Rene Reid, International Fertilizers, executive director; Guy Gubbay, William Houde Ltd., president; Marcel Roy, Canada Packers Ltd., agronomic committee chairman; and Arthur O'Donoughue, Cyanamid of Canada Ltd., advertising and public relations chairman.

Pyrethrum Industry Stable

D. H. Pell-Smith, chairman of the Pyrethrum Board of Kenya, told American pyrethrum producers, during a recent visit to the United States, that "as clearly as anyone can foresee, the pyrethrum industry will continuue to meet its world committments regardless of political developments in Kenya."

He said that an independent Kenya, run by a native government, would do everything possible to foster agriculture of all types, as this is the mainstay of the modern Kenya economy. Mr. Pell-Smith was one of the pioneers in developing the cultivation of pyrethrum on the high plateau of Kenya.

NPFI MEETING

(*From Page* 31)

tion. To draw a representative sample of such materials from huge piles representing many tons of numerous batches, each varying in many ways one from the other, is no simple, easy matter. The wonder is they do as well as they have been doing. In former years perhaps it was easier because of the nature of the earlier fertilizer mixtures.

"Present technology has created many new problems. The high analysis fertilizers require materials having much higher concentration of plant food. For example, among the nitrogens are urea, 45% nitrogen; ammonium nitrate, 33.5%; anhydrous ammonia, 82%; and solutions with 41 to 45%. Phosphates will have from 46% to 62% P_2O_5; Potash will have from 50 to 62% K_2O. Many of these materials will easily and quickly absorb moisture from humid air. Processing has become complex and requires the careful measurements and controls characteristic of modern chemical engineering. Variations occur in the composition of the materials, in the calculation of the formulas, in the flowmeters and other measuring devices and in the operating personnel.

"The control laboratory is called upon to chart the course to reduce cost and avoid the penalties of state inspection; that is, it must keep formulations within strict bounds and prevent other inefficiencies that lead to higher costs; and it must insure the company against deficiencies from the guaranteed analysis to avoid penalties and loss of good will. For this reason and many others that could be cited, the control laboratory is, and should be, one of the strongest aids to management, linking research, production and sales and insuring good will among customers. And yet, in many organizations in our industry having a chemical laboratory, this important section is not rightly appreciated by top management. Why? Who knows? Perhaps it is the short-sightedness of top administrators; or, the failure of the chemist-in-charge to publicize his worth or demonstrate his value to the operating and sales personnel. The time is not far off, however, when the force of events will necessitate a well-equipped chemical control unit in each fertilizer company, capable of inspiring respect and confidence, within and without, the company. The control chemist will then come into his own, will be given full opportunity to show his value and be properly rewarded, financially and otherwise, as will be his due."

Magruder Check Fertilizer Program

E. M. Glocker, W. R. Grace & Co., observed that "The Magruder Sample work typifies one phase of an attack on plant control problems. It shows," he said, "how one phase of the variation of the operation can be measured for the purpose of improving performance." Mr. Glocker described the program for checking a laboratory's accuracy and precision, and pointed out that as laboratories come closer and closer to the average range between duplicate determinations, a trend toward better precision is set in motion.

"When uniformity of a product is obtained by blending," stated Mr. Glocker, "knowledge of the variance of the batches going into the blender is essential. Capital costs can be kept down by purchasing the correct size blender rather than a larger one which would produce uniformity well beyond that required or even measurable by regular methods of analysis. Conversely, knowledge of the variance can be used to assure that a blender will be adequate."

Mr. Glocker concluded his discussion with the following comments, "The Magruder Check Fertilizer Sample Program covers some of the steps involved in plant control. We are starting to get information on the accuracy and precision of different official analytical methods. In the future, other questions connected with sampling and sample handling can be covered if

desirable. Already there is indication of improved performance in certain cases. As the program continues it will be possible to evaluate the rate of over-all improvement in laboratory accuracy and precision. With this demonstration as a guide to what the consistent application of modern statistical techniques will do, let us extend the use of these mathematical methods to other phases of operation which may be near but not quite at the peak performance level."

NPFI Manual on Analysis

The industry's need for detailed, standardized methods for sampling and assaying the increasingly important nitrogen fertilizer solutions was reviewed by C. H. Russell, Monsanto Chemical Co. He pointed out that chemists following the AOAC methods do not always interpret a given analytical method in exactly the same way, and that this has resulted in several industrial variations in the same procedure. Prompted by requests from industry, NPFI has worked with a committee of representatives from industry, who have prepared an NPFI manual written especially for the industrial technician for sampling and analyzing the various solutions containing nitrogen compounds. When possible, the procedures are based on the AOAC methods.

Mr. Russell, reported that the methods cover the following nitrogen solutions:

anhydrous ammonia
aqua ammonia
ammonium nitrate solutions
urea solutions
ammonia plus urea
ammonia, ammonium nitrate and urea
ammonia and ammonium nitrate
ammonia nitrate and urea

The manual will be classified into four sections:

1. Sampling and analysis of anhydrous and aqua ammonias
2. Sampling and analysis of fertilizer solutions, — and the methods for sampling both low and high pressure solutions
3. Sampling and analysis of solid fertilizers
4. Preparation of reagents needing additional processing after being received from the supplier.

J. R. Archer, International Minerals & Chemical Corp., gave specific examples in sampling and analyzing fertilizers, describing several sampling instruments, including the Archer tube sampler. As a result of work by the committee, it was reported that there is little evidence that samples drawn from the same bag by instruments differ more, on average, than samples obtained from the same bag by riffling. It also was observed that "the 'true value' of the composition of a fertilizer is not what your laboratory says it is, but what the state control chemist says it is. This fact is sufficient reason for the industry to take a deep interest in official methods of chemical analysis."

The problem of "overformulation" is just one source (although a very substantial one) of plant losses. Other losses, described as "in-plant shrinkage" have been under study by another industry task force. The complete report on the "In-Plant Shrinkage Study", presented by Dale C. Kieffer, Smith-Douglass Company, appears on pages 43-45 of this issue.

The plant-loss problem was vividly illustrated in several examples cited by Albert Spillman, manager, Fertilizer Manufacturing Cooperative, Inc., showing where and how these losses occur. "A little extra for good measure" in the bagging operation adds up to tons of fertilizer "simply given away." Mr. Spillman pointed out that ¼ lb. over, in an 80-pound bag, will amount to a loss of 31.25 tons in a 10,000 ton plant, or as much as 156.26 tons in a 50,000 ton plant. By the same token, an excess weight of 1-pound per bag (80-pound weights) results in a loss of 125 tons in a 10,000 ton plant, or 625 ton loss in a 50,000 ton plant.

It is most important, observed Mr. Spillman, that full advantage be taken of the concentration of raw materials received in shipment. An analysis of 10 cars of muriate of potash received at FMCI, showed concentrations ranging from 60.40% to 61.80%; Ten cars of superphosphate re-

ceived, showed a moisture content ranging from 3.60% to 6.75% and A.P.A. analysis ranging from 47.94% to 44.82%; specific gravities of nitrogen solutions were found to vary from 1.033 to 1.180 or translated into pounds per gallon, 8.61 lbs/gallon to 9.83 lbs/gallon; Similarly, specific gravities of 10 cars of phosphoric acid received, varied from 1.694 to 1.770, with A.P.A. analysis of 52.65% to 53.10%, respectively.

The analysis of raw materials (specific gravity for liquids and concentration for solid materials) is most essential to efficient plant operation. Fertilizer formulation can be very costly if not calculated correctly, taking into account the exact analysis of the respective raw materials.

"In recent years," observed Mr. Spillman, "our industry has made great progress in fertilizer technology. Fertilizer manufacture has changed from a mixing art to a science." Fertilizer manufacture is a chemical business, and as such, all tools of chemical and quality control must be used to full advantage. "Operating personnel should work together," said Mr. Spillman, "exchange information and keep close contact with research." The plant foreman and superintendent play an important role in plant operation, and should be recognized as a part of management. In connection with good housekeeping and plant maintenance, Mr. Spillman listed the following check list:

1. Scales must at all times be in excellent condition, and checked for correct weight.
2. Spillage must be kept to a minimum (with the high analysis fertilizer and raw material, a 2% loss may be 10 times higher than 5 years ago.)
3. Clean pulleys and return idlers.
4. Get personnel into the habit of keeping the plant clean.
5. Good preventive maintenance, with adequate replacement parts on hand will help keep a plant operating efficiently.
6. Formulations to be made in a plant should depend on the facilities available for storage, bagging and handling.★★

EDITORIAL

(*From Page* 27)

will aid his customer to make an additional return per acre of from $5.00 to $10.00 from correct fertilizer use. We have seldom seen a more logical or convincing argument against the pointlessness of price cutting.★★

PROCESS LOSSES

(*From Page* 45)

insoluble forms. Apparently, there is slightly more reversion in plants producing pulverized fertilizer than in the granular plants, but the difference is relatively insignificant. About .3% to .5% of the P_2O_5 loss is due to reversion.

With the exception of nitrogen losses at the ammoniator, substantially all of the shrinkage at the various points of manufacture is of the magnitude of a fraction of a percent. However, these small fractions can add up to a significant cost.

Based on the information that has been submitted to the committee, plants producing granular fertilizers lose from 4% to 6% of the nitrogen; 2 to 4% of the phosphate, and 2 to 3½% of the potash in-put; whereas, the plants producing non-granular fertilizer lose from 1½ to 3% of their nitrogen; 2 to 3% phosphate and 2 to 3% of the potash in-put.

Actually, granulation is still comparatively new to most fertilizer manufacturers in the United States, and it can be expected that the more complicated a process becomes the more opportunity there will exist for shrinkage. . . . However, there is room for improvement, particularly in nitrogen recovery in the granular plants. Since the fertilizer industry is highly competitive—and no company can afford to overlook losses of any magnitude—the industry will eventually have to show an overall improvement.★★

THE DEALER'S ROLE

(*From Page* 36)

cational groups is helping the farmer take soil tests, sending in soil samples and interpreting soil test results. Those dealers who perform these services had the following characteristics:

1. They maintain a relatively high mark-up on fertilizer over purchase cost—10.7 percent (average all dealers 9.3);
2. They have a relatively high gross profit margin on fertilizer — $5,400 (average all dealers $4,000);
3. They have relatively high fertilizer knowledge;
4. They believe the farmer expects them to be a consultant on fertilizer matters and believe they should influence the farmer's decision regarding fertilizer use;
5. They see the fertilizer business as "excellent" or a business with a "great potential" (rather than poor, average or a sideline);
6. They see their fertilizer department as a money maker in itself (rather than a customer service or not a money maker);
7. They are less worried about fertilizer competition;
8. They tend *not* to offer price discounts or credit.

Negative Dealer Attitudes

The state-wide dealer sample was asked, "What, within your own business, do you most dislike about selling fertilizer?" The answers were as follows:

	Per Cent
The labor involved in handling	18
The low profit return	15
Problems with credit	15
Seasonality of business	13
Strong competition	12

Calling on farmers	4
Other dislikes	11
No dislikes	13

The dealers were also asked to complete the sentence, "I would push fertilizer harder but . . ." The responses were as follows:

	Per Cent
Low profit return	32
Lack of time	22
Lack of facilities	12
Don't like problems with credit	8
Other reasons	15
I do push as hard as I can	11

The dealers were asked, "What competitive practice currently being used is working to the fertilizer industry's disadvantage in the long run?" By far the most frequently mentioned practice was price cutting, listed by a third of the dealers.

As one analyzes the answers, a number of specific attitudes are in evidence: low profit return, lack of time, credit, lack of facilities, price cutting, etc. However, at a slightly higher level of analysis it appears that the dealers may be saying that in terms of the expected returns for time, capital, labor, facilities and management invested in their fertilizer department they believe they are better off to invest most of these resources in other departments of their business. How valid is this reasoning? A precise answer will not be known until we do much more intensive research on the marginal returns derived from alternative allocation of resources within those firms selling fertilizer. However, there are some known data that can be brought to bear on this problem.

1. For the great majority of the dealers interviewed it is impossible to get any type of accurate data on specific inputs and returns on the fertilizer department. In many cases the fertilizer business is put in the miscellaneous category with many other "fence-post" items. Data upon which one can estimate the relative costs and benefits of offering specific services or promotional activities are almost non existent. There is a great potential for improving management in many of dealer businesses that sell fertilizer. This may well be one of the major challenges that the fertilizer industry must face. Some major fertilizer manufacturers are already actively working on this problem.

2. While many dealers hold negative attitudes toward the fertilizer business, there are many others who think the fertilizer business is excellent, that it has a great potential, that margins are adequate. They are moving relatively large volumes of fertilizer. Farmers apparently want certain kinds of service—in many cases services not now being offered by their dealers, and most farmers are apparently willing to pay for those services. Dealers offering these educational type services are able to keep their margins above the average, their gross profits above average and move more than the average amounts of fertilizer. The answer is obvious, many dealers have met and overcome many of the problems that are bothering other dealers.

One might infer that some dealers are selling only a *price* while other dealers are selling a product, services and an educational program that should benefit the farmer. It is not difficult to think of a relatively average situation where a dealer could "sell" price discount and "save" the farmer from $.75 to $1.50 per acre. However, the dealer has an alternative course of action. He can help the farmer in fertilizer programming through soil sampling and soil sampling interpretations, on-the-farm planning and checking of fertilizer results. He can provide proper methods of application. If the dealer follows this course of action, he might well help the farmer make an additional $5.00 to $10.00 per acre (even more in some cases) from proper fertilizer use.

3. Can the dealer be reached?

76 percent of the dealers want additional fertilizer product, use and application information;

75 percent desire additional information on new improved fertilizer sales techniques.

When dealers were asked to rank the sources of information about fertilizer that were most useful to them, commercial sources were mentioned most frequently (75%). Within this commercial group, fertilizer salesmen ranked highest, followed by fertilizer company publications, fertilizer manufacturer representatives and fertilizer clinics. The governmental educational services of the USDA, College and Extension Service were a close second to the commercial sources.

An attitude of receptivity seems to exist among many dealers. The industry appears to have one of the most important communication routes already established to these dealers. However, if the dealer is to be motivated to push fertilizer, it is going to take a well planned and implemented program backed by financial and qualified human resources. The day of the price detective, "order taker" salesman is passing out of the picture. The alternative may be the well trained specialist who can give expert advice on business and farm management and sales and educational programs as well as fertilizer and fertilizer use.★★

PESTICIDE DISTRIBUTION

(*From Page* 41)

of a geographic area are often difficult to change. The adaptability of the equipment and the financial condition of the area, or of the times, are influential. These point up the need for warehousing and service of the right product at the right time.

The user of pesticides, unfortunately, often has neither the detailed knowledge of the product, nor the long term experience with its use, to understand the complex problems that necessarily accompany the application of pesticides. While many farmers are familiar in general with the older type pesticides, there are a host of new and improved products coming on the market each year that require new methods of handling and application, as well as specific precautions to be observed. And the farmer is not the only consumer. Others include the aerial applicator, the PCO, the right-of-way applicator, the ground sprayer, etc. With most of this consuming group the label alone is not adequate to carry all the necessary instructions, nor does it cover the responsibility.

As a case in point, we can refer to an address by the Chief of the Bureau of Chemistry of the California State Department of Agriculture, who pointed out that the marketing outlet and, specifically, the salesman, is frequently blamed for accidents. The farmer, in reality, often gives predominance to the comments and advice of the salesman rather than to "official recommendations." In other words, regardless of the nature of the marketing outlet, he, it, or they, are looked upon as authorities. The manufacturer of a pesticide must be cognizant of this at all times – it is just another function of marketing.

Mention is often made of the constantly increasing need for proper product application. These instructions must come from technical service, dealer-distributor field service, published brochures and data, regional and local meetings which must involve the pesticide manufacturer; be it direct or through the agents of the distribution channel.

Certainly there is a need too for money. The financer must be rewarded. If the pesticide is sold for cash, then a discount is normally expected. Term payments and consignments must bear the higher price tag. And if this isn't occurring in a particular pesticide at a specific time, you may be certain that "the day will come." Money costs!!! Somebody has to pay the piper. So regardless of the number of steps in the channels of distribution, there is a need for money.

This brings about the necessity for educating the various channels to budget both cash generation and profit. A budget tells us what we can't afford, but it doesn't keep us from buying it.

If this isn't taught by the local sources of funds, then it will eventually be taught by the manufacturers whose interest rates are increasing more and more each year. So there is a financial education which is sorely needed in pesticide distribution.

Each manufacturer must determine for himself in which direction he will go. He, and all of us, must remember that in Distribution, as in all other areas, success is a journey, not a destination.★★

FERTILIZER VIEWS

(*From Page* 50)

the dicalcium phosphate in the nitrophosphate process is the dihydrate form, $CaHPO_4 \cdot 2H_2O$, and this type upon being granulated, has a tendency to lose its water of hydration and to revert to the anhydrous form, $CaHPO_4$. According to the chemical test commonly employed to evaluate the availability of a phosphate, the dihydrate form is soluble in ammonium citrate solution, whereas the anyhdrous form is not, and therefore is to be considered much less valuable as a plant nutrient source of phosphorus.

Field tests carried out officially in Denmark and in England have led to the conclusion that the phosphate in complex fertilizers is worth, price-wise, about 75 per cent of the value of that in superphosphate compounds. In the United

States, at present only one company is producing a complex fertilizer. Farmers in the Pacific states seem to be using the product satisfactorily.★★

LISTENING POST

(*From Page* 67)

used, was considered by Taylor and Dobson to be due largely to the fact that, because in their tests they desired to retain the original distribution of the fertilizer, they omitted the usual mixing of the fertilizer with the soil before planting the peppers. They stated also that the rates used were much higher than the recommended rates for pepper.

In one test the plants were sprayed with maneb (manganous ethylene bisdithiocarbamate) and tribasic copper sulfate to control Cercospora leaf spot *(Cercospora capsici)*. Comparison with the other, unsprayed, test showed that the sprays did not affect the development of bacterial spot; nor, on the other hand, did rate of fertilization affect incidence of Cercospora leaf spot.

Inhibition of Germination

Inhibition of germination of apple scab conidia by certain fungicide formulations was reported on by Dwight Powell (3), of the Illinois Agricultural Experiment Station, who studied the action of certain chemicals on conidia of the apple scab fungus *(Venturia inaequalis)*. The chemicals tested included captan 50W (*N*-(trichloromethylthio) - 4-cyclohexene-1,2-dicarboximide), dodine 56W (n-dodecylguanidine acetate), Phaltan 50W (50% formulation of *N*-trichloromethylthiophthalimide), Niacide M (53.9% manganous dimethyldithiocarbamate, 10.9% triram, 2.9% benzothiazyl disulfide, 2.3% manganous benzothiazylmercaptide), dichlone 50W (2,3 - dichloro - 1,4 - naphthoquinone), zineb 65W (zinc ethylene bisdithiocarbamate), and Dyrene 50W (50% 2,4-dichloro-6-(chloroanilino triazine)), at concentrations of 150 to 2400 parts per million. Untreated, scab-infected leaves, still on the tree, were immersed in the various concentrations of the test chemicals. At intervals of 1 to 21 days thereafter, the leaves were detached and taken into the laboratory for spore-germination counts.

Inhibition of spore germination was greatest and most lasting with dodine 65W, captan 50W, Phaltan 50W, and Dyrene 50W at 2400 parts per million. At lower concentrations of these chemicals, the residual effect was much less. Spores recovered completely from the dichlone 50W treatment in 10 days. The effect of Niacide M was not large to begin with but was persistent. Zineb 65W was not effective. A captan 50W-zineb 65W mixture gave results comparable with those from captan 50W alone. A captan 50W-dodine 65W mixture was slightly synergistic. Both captan 50W and Phaltan 50W inhibited release of spores from lesions.★

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O.E. LINCK CO.

(*From Page* 33)

"The necessity for making five or six different formulations of a product, — all based on the same active ingredient is one of the biggest headaches to the average formulator," says Bob Linck, (son

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of the founder, O. E. Linck), when asked about inventory in the formulation plant. "Each of the formulations has some particular appeal," he said, "which is demanded by the customer." One of the formulations of the Di-met series, for example, controls just crabgrass; another includes 2,4-D and DSMA for crabgrass and other weeds; a third is a general all-purpose herbicide, etc. This problem of multiple formulations could be solved, he pointed out, through intelligent sales by the dealer.

This introduces another common problem, added O. E. Linck, that "salesmen have become order takers instead of salesmen". They handle too many products, he believes, and do not know the values of one line, — nor are they behind any one product. When a dealer asks for a crabgrass killer, — the salesman offers five different kinds, — all of which are put on the shelf. Even though this offers variety, when just one product is sold, the profit is still on the shelf.

O. E. Linck & Co. is operated by the founder, O. E. Linck, and his son Bob, who joined the company some five years ago. The company had its beginning in very unprofessional surroundings, recalls Mr. Linck, in explaining that he started the business by making ant traps in his mother's basement back in 1930. Ant traps and baits are still a very important sales item, points out Bob, — and they are still based on thallium sulfate. Those were the days when nicotine sulfate, the arsenates and bordeaux mixture were the heart of the pesticide business.

The discovery of DDT was the stimulus that caused O. E. Linck Co. to expand its activities in the insecticide business, — as it did many other pesticide formulators at that time. And, as the insecticide industry grew, — so did O. E. Linck Co.

Linck sales are primarily to garden centers, golf courses, etc., — and this home garden market for agricultural chemicals has been expanding in recent years, (one of the side effects of the nation's move to "Suburbia"). Thus, O. E. Linck Co. can, — and does — anticipate further growth!★★

PEST ROUNDUP

(*From Page* 65)

2.36 compared with 1.73 in 1959. Outlook for infestations this spring in potatoes and corn is the highest in 6 years. The spring survival survey conducted in Iowa showed the average number of live European corn borer larvae per acre of corn debris in oatfields to be 726, compared with 3,049 in 1959.

The alfalfa weevil continues to spread in the eastern United States. During recent weeks the insect has been taken for the first time in several east Tennessee counties. Damaging populations of the weevil were reported during late May from the majority of the infested eastern states whereas populations were noneconomic in most of the western states.

Leaf rollers caused some concern in various orchard areas during May. A serious infestation of the red-banded leaf roller was found in apples in western Washington County, Ohio, in early May. Numerous egg masses were also reported from Ashtabula County. The fruit tree leaf roller was a definite threat to apple orchards in the Orleans, Indiana area. Populations were especially heavy in untreated orchards and above normal for well-kept orchards. This species appeared in sufficient numbers in the Carbondale, Illinois area to warrant control.

Among the forest insects, pine sawflies were causing damage in several areas. A serious outbreak of sawflies on shortleaf pine was reported from Union County, North Carolina. Heavy defoliation was reported from Vance County, with scattered defoliation from other areas. The sawfly outbreak

in Virginia continued at a somewhat reduced rate in stands suffering heavy defoliation for two successive years. Defoliation has increased this year in the Farmville area of Prince Edward County, where it had been relatively light for the two previous years. Sawflies were denuding Virginia pines at several localities in Montgomery and Prince Georges Counties, Maryland. Controls were needed for the insects on white pines in two Athens County, Ohio locations.★

EFFECTIVE DEFOLIATION

(*From Page* 61)

with a limited number of spindle pickers available must have some of his fields defoliated later than others.

Where mechanical stripping is planned, applications of defoliants should be timed so that all leaves will shed prior to the average date of the first killing frost. All bolls should be open before stripping begins.

Weather Conditions

If rainy weather or humid conditions prevail, open or mature bolls of the bottom crop may rot quickly. Defoliants may be applied solely to reduce further deterioration, but, if the top crop is not sufficiently mature at this time, a decision must be made as to whether more will be gained by reducing rot than might be lost through immaturity of the top crop. In some areas, the practice of bottom defoliation is being explored. The idea is to control deterioration of the bottom crop without seriously checking development of late top bolls; in some cases, this also will permit an earlier first picking. In irrigated areas of the west, where large plants and high yields make it economical, this practice is gaining favor.

Weather always should be considered in timing the application of defoliants. It can have a marked effect on the mechanics of application, on the rate of defoliant required, and on the speed of leaf fall. Temperature must be moderately high to insure rapid shedding of leaves. Excessively high temperatures, however, could result in the leaves' drying up too fast and becoming a troublesome source of trash in lint.

The efficiency of some dust defoliants depends on either dew or high humidity. Spray defoliants are not entirely dependent upon atmospheric moisture, but many are more efficient if applied when humidity is moderately high. Wind affects efficiency of application. Even in moderate winds, dusts are hard to distribute thoroughly and high winds interfere with sprays. Slight breezes, however, often improve distribution of sprays.

In some states, through cooperation of the U. S. Weather Bureau, extension services, and other agencies, specialized weather information is available to applicators and frequent radio broadcasts give prediction of rain, dew conditions, humidity, wind velocities, temperatures, and other useful data.

Types of Defoliants

The two general types of cotton defoliants are, of course, dust and spray. For calcium cyanamid dust, a dew, mist, or some other prolonged source of moisture is necessary. The time interval when moisture must be available on the leaf surface may be shorter, however, if leaf moisture content and temperature both are high. Dew is not necessary for monosodium cyanamid dust because the chemical draws moisture from the leaf or air as humidity rises. This defoliant works best when foliage contains ample moisture, or humidity is moderately high following application.

Spray defoliants may be used under arid as well as humid conditions. Dew is not necessary and leaf moisture need not be as high as when dust is used. If leaf moisture is low, however, and leaves are tough, application rates must be increased. This often causes much leaf desiccation, slower leaf fall,

and some freezing of leaves to the plant.

In applying defoliants, each leaf that is to shed must receive a covering of the chemical. Equipment used for applying insecticides also may be used for distributing defoliants. There are, however, some differences in the physical makeup of insecticides and defoliants, and ground machinery must be adjusted to provide correct application of defoliants.

Tractor-mounted sprayers may be used in areas where the cotton plant does not grow large and limbs do not lap in the middle. To obtain adequate coverage of the plant, additional nozzles may have to be added and nozzle tips suitable for defoliants must be installed. Wheel fenders, of course, should be used on tractors to reduce damage to the crop.★

APPLICATION PRICES

(*From Page* 59)

costs or changes in the application business are or should be. Cost variation between operators has been illustrated and some of the economic relationships have been pointed out. Those who attempt to adapt and employ these principles may find them useful.

If the variation in cost structure between firms, suggested in the preceding paragraphs, is valid, each manager must make a careful analysis of his own costs and discover the magnitude of fixed and variable costs within his own business. Then, and only then, will he be in a position to apply these basic data to his estimate of the demand curve present in his market. It would be nice if we could say that the costs of every firm were thus and so, and thereby be in a position to generalize and recommend prices. Indications are that such generalizations are of extremely limited use to the individual, however, and are of value only as a benchmark in comparing his own position with that of the average firm in the aerial application business.★

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News Brevities

DR. JACKSON P. ENGLISH has been appointed director of chemical research for the agricultural division of American Cyanamid Co., New York. He had been assistant director of the experimental therapeutics research section of the company's Lederle division.

AC

ALBERT F. KROEGER JR. has been appointed district sales manager for the San Francisco area by the Mineral Products Division of Food Machinery and Chemical Corp., New York.

AC

THE SMITH-DOUGLASS CO.'s plant at Albert Lea, Minn., recently received a plaque from the National Safety Council in recognition of the plant's 1,500 days without a lost time accident.

AC

DR. CARL F. PRUTTON, executive vice-president of Food Machinery and Chemical Corp., New York, received the honorary degree of doctor of engineering from Clarkson College of Technology, Potsdam, N. Y., during the school's 67th commencement exercises, June 5.

AC

P-D SERVICE, Inc., Pavilion, N. Y., has been appointed a distributor for Highway Equipment Co., Cedar Rapids, Iowa. They will serve a 20-county area in western New York.

AC

DOYLE E. PEASLEE has joined the staff of the Connecticut Agricultural Experiment Station, New Haven. He received his Ph. D. degree from Iowa State University this year.

AC

WILLIAM F. CHRISTOPHER has been appointed director of marketing for the Hooker Chemical Corp., New York. He had been with the General Electric Co.

AC

C. A. CREMENS has been appointed Chicago district manager by Richardson Scale Co., Clifton, N.J.

Equipment, Supplies, Bulletins

Eastman Antioxidant Folder

The applications of Tenamene 3 (2,6-di-tert-butyl-p-cresol) as an industrial antioxidant are discussed in a brochure available from Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Co., Kingsport, Tenn. Performance charts and graphs illustrate the effectiveness of Tenamene 3 as an antioxidant for such materials as pyrethrin-containing insecticides.

•

Polyethylene Film Mulch

Preliminary tests at the Union Carbide Corp. Research Farm in Clayton, N. C., indicate that significant increases in tree growth result from the use of black polyethylene film mulch around the base of the tree.

The added growth is said to result from the film's helping to preserve moisture in the soil and preventing the growth of weeds. In addition, the film mulch moderates both summer and winter soil temperatures and reduces fertilizer leaching from irrigation or rainfall.

•

Vegetable Spray Guide

Niagara Chemical Division of Food Machinery and Chemical Corp., Middleport, N.Y., is offering a pest control guide designed for use by vegetable growers. The 20-page guide contains detailed charts which are useful in treating various crops for specific pests. Copies are available from the company.

•

New Pesticide Surfactant

Petrochemicals Company, Long Beach, Calif., have added to their line of surfactants a new wetting agent, Petro WP, for use in the production of wettable pesticide formulations.

The new product is a combination of anionic and non-ionic wetting agents. It is available as a 98% active, relatively non-hygroscopic powder, packed in 200 pound drums. The manufacturer reports that Petro WP, used at ¼% rate, will provide wetting to such powder formulations as 50% DDT, 50% chlordane, 25% malathion, parathion and Trithion.

Petrochemical announce they are establishing national distribution methods, and will welcome requests for samples and formulation assistance.

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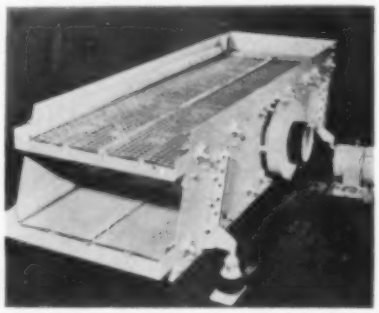
Tyler Vibrating Screen



The W. S. Tyler Co., Cleveland, Ohio, is offering a new line of vibrating screens, called Ty-Rocket, that is supplied without a supporting base, and has a modular design, so that several different sizes can be assembled from standard components.

The Ty-Rocket screen is vibrated by an off-balance shaft which imparts a high speed, circle-throw motion to the screening surface. Four universal brackets mounted on the side of the frame permit attachment of either supporting feet with spring mounts (as shown), or overhead cables with spring mounts for suspension mountings.

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Midstate Package Plants

A series of package plants for blending and mixing bulk fertilizer is being offered by Midstate Machinery Co., Decatur, Ill. Designed for installation in any steel or frame building, the pre-engineered plants are furnished with equipment, detailed assembly plans, and a choice of floor plans to fit the building and operating requirements.

The smallest plant is designed for one man operation and utilizes a minimum of equipment to produce 15 tons of mixed and blended fertilizer every hour. A larger version boosts capacity to 30 tons.

Seed Disinfectant Folder

South American Minerals & Merchandise Corp., New York, is offering a technical bulletin describing its new seed disinfectant, methyl mercury pentachloro phenolate (compound "473"). The product is said to control loose smut of oats and bunt of wheat.

The technical bulletin is available from the company at 425 Park Avenue, New York 22.

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New C & I Bulletins

Chemical & Industrial Corp., Cincinnati, Ohio, have recently issued two new bulletins: (1) The C&I Ammonium Nitrate Prilling and Solutions Process; (2) C&I Complex Fertilizer Plant. Each booklet contains a diagramatic flow sheet, and describes the respective process.

The C&I complex fertilizer plant features a spherodizing unit where fertilizer slurry is pelletized and dried. The C&I Prilling process is based on prilling an almost anhydrous ammonium nitrate melt in a tower about ⅓ the height of conventional towers.

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Cossman Offers Fly Cake

E. Joseph Cossman & Co., Hollywood,, Calif., is offering a "Fly Cake" containing DDVP for use in dairy barns, around livestock, and in living areas where sprays sometimes are not desirable. The Fly Cake is a solid, donut-shaped cake which, when kept moist, is said to retain its killing power for a complete season.

In tests conducted by the company, the Fly Cake attracted flies and killed them seconds after they had landed on the cake. It also is said to control roaches, ants, and other crawling insects.

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TALE ENDS

THE emphasis was on working with the dealer to help him sell more fertilizer, at the annual meeting of the National Plant Food Institute held last month. Which reminds us that, like the weather, this is something that a lot of people talk about, but, with a few notable exceptions, all too few actually do anything about it. While we are on this subject, we might suggest that one thing needed if the dealer is to be educated, is a well-edited dealer magazine for the ag chem trade, — one that would have a really substantial circulation in the neighborhood of forty or fifty thousand, and not just a smattering of dealer coverage here and there. Sometimes we wonder why one of the rather too numerous publications that attempt to serve the agricultural chemical manufacturing industry don't turn instead to the wide open and more ambitious field of helping to educate the dealer.

Attendance was down from previous years at the NPFI meeting, — the very probable explanation being that, with fertilizer movement to users running so far behind the normal seasonal rate, some fertilizer executives may have felt that they could not afford to be away from home base at this busy time.

AC

Prominent at the convention was a delegation from India, all of whom are prominent in the fertilizer industry there. The group, invited by Mr. Ten Eyck of International Ore & Fertilizer Corp., included V. V. Venugopal managing partner of Mysore Fertilizer Co. and Mysore Insecticide Co., Charat Ram, managing dierctor of DCM Chemical Co., A. Rahimtula, manager of Indian operations of PVT, Ltd., and H. Zaheer, director of the regional research laboratory in Hyderabad, India, whose responsibility it is to determine what India's fertilizer plants will produce, what will be imported, and what materials will be employed. All four were accompanied by their wives, who showed convention attendants the latest modes in the typical Indian costume for the well-dressed lady, the sari.

AC

Word reaches your reporter from the usual reliable quarters that consumption of insecticide in fertilizer-pesticide mixtures is up about twenty percent in volume this season. In spite of the fact that many fertilizer manufacturers continue to oppose having anything to do with insecticides, buyer demand expands the market for the combination products. One limiting factor, we are told, has been the growth of the trend toward deep placement of fertilizers in some areas, notably Nebraska and Iowa. Where mixed fertilizers are to be applied in the neighborhood of seven or eight inches below the surface, this deep placement eliminates the possibility of using the combination products, since pesticides are not effective at that depth.

AC

Look for an announcement shortly regarding ownership of the patent covering DDVP. Here we had been thinking all along that this was a product which had been discovered and developed by the USDA. The fact is, however, that a number of commercial firms had been working on the product, with their research antedating that of the government workers, and two of these companies are now contesting for the patent. The word we get is that one of the big, well-known pesticide concerns is just about to win its case, and will have one more to add to what is already quite an imposing arsenal of top pesticide products. The pesticide industry should probably anticipate a considerably expanded use of DDVP in a series of new consumer products, once the patent fight has been decided.

AC

Also to be announced in the near future, our agents advise us, is a promising new herbicide intended specifically for use in controlling grabgrass.

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